

UNFCCC Secretariat

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Response to request for review: CDM Ref. 1443

“Project for the catalytic reduction of N₂O emissions with a secondary catalyst inside the ammonia reactor of the nitric acid plant at Dongbu Hannong Chemicals Ltd., Ulsan, Korea (“Dongbu”)”

Dear Members of the Executive Board,

Please find below our response to each of the issues raised by the Executive Board members in their request for review for the registered CDM Project No. 1443.

1. The PP shall submit all the required monitoring parameters at the intervals required by the methodology.

Dongbu operates one data acquisition system that accumulates the analogue plant operating data (OTh, OPh, AFR, Air Flow, AIFR, NAP) from the Process Control System (PCS) into a PC.

The analyser unit contains its own CPU which receives the NCSG and VSG data as well as O₂ concentration (all converted from 4-20 mA analogue data into digital signal). This CPU generates minute-by-minute average values from the 2 second raw data which are then sent via Ethernet cable to the same PC in the control room that already collects the plant operating data. Dongbu staff generate minute-by-minute averages from the plant operating data (OTh, OPh, AFR, Air Flow, AIFR, NAP) to match the minute average data for NCSG and VSG received from the analyser CPU.

To obtain the results for stack gas flow VSG (Nm³/h) at normal conditions (101.325 kPa and 0°C) from measured differential pressure the instrument equation – taken from the AMS manual – is used which includes pressure (PSG) and temperature (TSG) correction. During the QAL 2 and AST test the correct implementation of the correction of VSG to standard conditions was audited by independent testing laboratories with EN ISO/IEC 17025 accreditation (SGS and Müller-BBM). During the test the VSG values were compared to the results obtained from measurements by a standard reference method.

As a result, there are now two sets of minute-by-minute average reports:

- Operations Data (OTh, OPh, AFR, Air Flow, AIFR, NAP)

- Emissions Data (NCSG, VSG, O₂, Errors)

From these two files the hourly average values are extracted and converted into EXCEL format to get a complete data set which is then imported into the N.serve Database Management System (N.DBMS).

N.serve, is responsible for the correct analysis of the delivered data in accordance with the methodology.

At N.serve the received data is stored at the N.serve fileserver in a special section for the storage of monitoring data separately for each project. The files are protected against manipulation by a password. Martin Stilkenbäumer at N.serve is responsible for the correct data handling and processing.

To ensure that the correct data is used in the N.DBMS calculation and to ensure that the calculations are done correctly, plausibility checks are done by N.serve using manual EXCEL calculations on the received data from the plant. For example the average values for the different parameters are calculated by EXCEL and compared to the results of Query 1 of the N.DBMS calculation.

After this plausibility check, the data is transferred from the received excel files into the N.DBMS in Microsoft Access for the analysis in accordance with AM0034. The results of this analysis are then exported into excel again where the final calculations are undertaken to derive EF_{BL} and EF_P which will then be used in the Monitoring Reports prepared by N.serve

All relevant data from the PDD, Validation report, QAL2 report and specific project related information are combined with the N.DBMS calculations in a final document as a Monitoring report.

Assuming that the monitoring results which are the basis for the calculation of emission reductions should be submitted, the attached excel file contains relevant values for OTh, OPh, AFR, AIFR, VSG, NCSG, NAP. There are separate folders for Historic Campaigns, Baseline Campaign and Project Campaign.

Prior to the start of the CDM project activity at Dongbu, the plant operating parameters were only recorded in a handwritten log-book as a spot value every two hours. As described in the PDD, the historic campaigns' operating parameters have been derived from this log.

The handwritten log is still continued as a back-up in case the PC storing the data from the PCS has problems or is down for a period of time.

2. Further clarification is required on how the baseline data were accepted since the equipment used for baseline monitoring does not follow EN 14181 as specified by the methodology.

In the following, it is described how the procedures given in EN14181 for QAL1, 2 and 3 have been practically applied at Dongbu nitric acid plant.

QAL 1

In accordance with EN14181 an AMS "shall have been proven suitable for its measuring task" (parameter and composition of the flue gas) by use of the QAL1 procedure as specified by EN ISO 14956. Using this standard, it "shall be proven that the total uncertainty of the results obtained from the AMS meets the specification for uncertainty stated in the applicable regulations".

The Manufacturer and type of the first N₂O Analyser was ADC MGA 3000 Continuous Emissions Analyser. At the time of placing the purchase order for the AMS at Dongbu in autumn 2006, only one analyser was available that had been certified suitable for N₂O monitoring under QAL1 of EN 14181 and ISO 14956. The supplier of the certified analyser however, was at the time unable to provide sufficient local support for the commissioning and servicing of the analyser. Moreover,

AM0034 states that EN14181 should be used as “guidance” and it was not clear at the time of the commissioning that EN 14181 would have to be fully complied with. This interpretation only emerged throughout 2007 by the validation opinions raised by DOEs.

For these two reasons, the ADC MGA 3000 analyser was considered more suitable for the local application.

This opinion was confirmed by the final QAL 2 report prepared by SGS (Report no. EZ/07/2023 dated 31/08/2007) which states that the measurement programme (QAL2) also covered the most important QAL1 issues for the used N₂O analyzer. The main conclusions as summarized in the report mentioned that ADC MGA3000 emission measurement analyzer and the flow meter Foxboro IVM30 comply with the QAL1 and QAL2 requirements of the European standard EN14181.

QAL2 and Standard Reference Measurements (SRM)

QAL2 is a procedure for the determination of the calibration function and its variability, and a test of the variability of the measured values of the AMS compared with the uncertainty given by legislation. The QAL2 tests are performed on suitable AMS that have been correctly installed and commissioned on-site (as opposed to QAL 1 which is conducted off-site). QAL 2 tests are to be performed at least every 3 years according to EN 14181 but also after major changes to the plant or changes or repairs to the AMS, which will influence the results obtained significantly.

A calibration function is established from the results of a number of parallel measurements performed with a Standard Reference Method (SRM). The variability of the measured values obtained with the AMS is then evaluated against the required uncertainty. According to EN14181, both the QAL 2 procedures and the SRM need to be conducted by an independent “testing house” or laboratory which has to be accredited to EN ISO/IEC 17025.

A series of QAL2 specific reference measurements using a the SRM method as per EN 14181 for guidance has been carried out at the plant in March and June 2007 by an accredited testing house (SGS Environmental Services, Netherlands) to ensure the AMS’ suitability, establish the calibration curve and test the variability of the measurements. The results of these SRM are available to the DOE as part of the verification process. The AMS calibration function as well as the total uncertainty of the AMS was determined. The results were applied in the calculation of EF_{BL}. The analyser passed all tests with good success including linearity tests for the complete measuring range, the test of variability and the drift test. The comparison to the results from the standard reference method shows a good match. All these results are giving a high indication for the fact that the Analyser fulfils the QAL1 requirements of EN 14181.

In the following section the other relevant QA measures that are followed by Dongbu are described. These QA measures are also required by EN 14181 and contribute to reliable measurement results during day to day operation of the AMS.

QAL 3

QAL3 is a procedure which is used to check drift and precision in order to demonstrate that the AMS is in control during its operation so that it continues to function within the required specifications for uncertainty.

This is achieved by conducting periodic zero and span checks on the AMS and then evaluating the results obtained using control charts. Zero and span adjustments or maintenance of the AMS, may be necessary depending on the results of this evaluation

AMS calibration and QA/QC procedures

Dongbu is certified according to ISO 9001 standards for quality management. The procedures for monitoring, regular calibrations and QA/QC are fully embedded into the procedures required by ISO 9001 and documented in the applicable ISO handbooks.

Calibration Gas

A certified N₂O Calibration gas (balance being N₂) with a precision of $\pm 2\%$ is used in the span calibrations.

Analyser Zero and Span Calibrations

Zero and span calibrations are conducted manually in intervals as required by the AMS manual respectively by the QAL2 test report. For the zero calibration pure nitrogen is used, for the span calibration a certified calibration gas is used. The results of the calibrations are recorded according to the related CDM procedure.

Flow meter calibration procedures

The flow meter is tested once per year during the AST test according to EN 14181. If the flow meter fails to pass the AST test, the pressure transmitter of the instrument needs to be recalibrated by the manufacturer or by the plant operator.

The probe of the flow meter itself does not need to be calibrated since it is a physical device which will not have drift. Therefore, it is sufficient to regularly inspect the physical condition of the probe.

Training

Operations staff at the nitric acid plant who are responsible for the operation of the AMS and regular calibrations, visual and physical checks have been trained appropriately by the AMS vendors and Dongbu's own instrumentation engineers.

We hope that these detailed responses to the issues raised are sufficient clarification to allow the CDM EB to accept the Request for Issuance of CERs for this project.

Sincerely,

A handwritten signature in black ink, appearing to read 'Albrecht von Ruffer'.

Albrecht von Ruffer
Managing Director
N.serve Environmental Services GmbH