UNFCCC Secretariat
Att: CDM Executive Board

Martin-Luther-King-Strasse 8
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21.01.2009

Response to request for review: CDM Ref 0490 – Monitoring Period 8
"Catalytic N_2O Destruction Project in the Tail Gas of the Nitric Acid Plant of Abu Qir Fertilizer Co."

Dear Members of the Executive Board,

Please find below our response to the request for review for the above mentioned project No. 0490, Catalytic N_2O Destruction Project in the Tail Gas of the Nitric Acid Plant of Abu Qir Fertilizer Co.

Request 1:

The DOE is requested to clarify the reasons for the repeated failures of the analysers as observed in this and the past verifications.

Carbon response:

Besides the response requested from the DOE, Carbon would like to present additional information on reasons for the failures of the analyser system.

a) Introduction – Actual problems/activities in the Monitoring Period

a1) From the 1st July 2008 to 12th July 2008 the outlet analyzer was out of operation due to a chopper failure at the analyzer (the chopper portions the samples for the analyzer). In order to handle the down time of the analyzer the relevant CDM/QA procedure implemented by Carbon Egypt was executed. The CDM/QA procedure includes immediate response to such alarms/malfunctions respectively in the system.

Detailed description: An analyzer alarm at the control room appeared at the 1st of July 2008. After immediate contacting with EMERSON Germany and ENTRAG Trading Group (the Agent for EMERSON Process Management in Egypt) the problem was analyzed. After intense fault diagnostics by EMERSON Germany and ENTRAG it finally was examined by the experts that the chopper at the outlet analyzer was broken down. Due to our *"Back Up Plan – Spare Parts on Stock On-site"* the needed spare part was available on-site.

ENTRAG replaced the chopper on the 11th July 2008 and the alarm at the control room disappeared afterwards. ENTRAG recommended a 24h testing phase which was monitored by Carbon Egypt. In order to finish the procedure Carbon Egypt executed a manual calibration on the 12th July 2008 after consultation with ENTRAG. After that the normal operation of the analyzer system was restored.
According to the CDM/QA procedures Carbon Egypt stocks a comprehensive range of spare part devices on-site. After installation of the spare-chopper Carbon Egypt immediately ordered a new spare part for the stock from EMERSON Germany. The spare-chopper was delivered on the 28th of July 2008 and ensures now the highest possible quality in terms of immediate reaction in case of any failures occurring.

a2) From the 29th July 2008 to 31st July 2008 the outlet analyzer was out of operation for regular calibration/maintenance activities (about a few hours per day).
According to our CDM/QA procedures Carbon Egypt has contracted (1) the Egyptian ENTRAG Group to execute monthly on-site **Health Checks** and (2) EMERSON Germany to execute the quarterly on-site **Inspection Visits**. (*see details at Carbon Response 2 – Back Up – EnviNOx® support)*
This inspection visit was performed by EMERSON Germany on the 29th July 2008 to 31st July 2008. Following statements are to clarify the work carried out:

- The calibration/maintenance activities were carried out on-site;
- The phase of outlet analyzer out of operation lasted only about a few hours per day;
- The work carried out at inspection visit was check and clean the filter, check the pressure regulator, check the sample handling system, check the solenoid valve, check the analyzer with internal diagnostic menus, leak test at sample system, clean sample lines with distilled water, manual calibration of the analyzer;

a3) In order to apply a conservative approach for the relevant periods, the historical minimum N_2O removal rate and historical minimum methane oxidation factor for normal operating days of the previous campaigns have been taken for determination of emission reduction. Those recalculations were done for the whole days 29th July 2008 to 31st July 2008 (also for 1st July 2008 to 12th July 2008) to ensure a twofold conservative approach.

Based on the recalculations the average N_2O outlet concentration for the period 1st July 2008 to 12th July 2008 and 29th July 2008 to 31st July 2008 was about 20 ppm. Compared to the measured average three operating days before and after the analyzer failure / maintenance of about 5 ppm this clearly shows the very conservative approach. This approach ensures a four times higher value at the outlet which guarantees a significant underestimation of emission reductions.

b) Reasons for repeated failures

Carbon Egypt is highly interested in a reliable and functioning analyzer system at its project in Abu Qir and has therefore implemented numerous measures in order to assure the high quality of the monitoring data. In the following explanations on the problems and their solutions are given including the continuous improvement on quality standards and service/maintenance activities which are a key for a reliable system.

b1) In the first three Monitoring Periods the analyzer system was working properly without any failures.

b2) In July 2007 the low sample flow alarms started to appear which led to immediate actions by Carbon Egypt. In cooperation with EMERSON Germany and ENTRAG the system was assessed and additional troubleshooting instruction for ENTRAG service engineers by EMERSON Germany was performed. To keep down time periods of the analyzer system short ENTRAG was onsite several times for additional emergency visits in the second half of 2007 and beginning of 2008.

In order to handle the analyzer problems and to further improve the reliability and availability of the monitoring system ENTRAG in coordination with EMERSON Germany developed a special maintenance procedure for the sample handling system which is now carried out by ENTRAG on a regularly basis.

To ensure highest possible quality of the monitoring data Carbon Egypt set two major steps. (1) EMERSON Germany trained the Egyptian service engineers and external monitoring experts at its factory in Hasselroth (Germany) from the 4th May 2008 – 8th May 2008. (2) Carbon contracted EMERSON Germany (technology supplier of the monitoring

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system) for quarterly Inspection Visits for regular calibration/maintenance checks and external experts from RWE for troubleshooting services. Since then the recurrent analyzer alarm hasn't occurred again until present day and the problem is solved.

b3) During the fourth Monitoring Period another analyzer alarm appeared. After intense discussion with Carbon Egypt and EMERSON Germany the problem was identified. The N_2O outlet analyzer drift caused by a defective cell was determined by EMERSON Germany and the cell was replaced on the 22nd August 2007 by EMERSON Germany. This was possible due to Carbon Egypt proactive strategy to keep numerous crucial spare parts on stock on-site and its CDM/QA procedures implemented and executed immediately after a failure occurs. This failure happened just once during the project duration and should therefore not be seen as a repeated failure.

b4) No repeated failures in the actual Monitoring Period

The quarterly Inspection Visits carried out by EMERSON Germany should not be considered as a repeated failure of the analyzer but a measure to ensure highest possible quality of the monitoring data through regular calibration/maintenance checks. As the Inspection Visits by EMERSON Germany are contracted and performed on a quarterly basis also the past verification period was affected by analyzer downtimes for about a few hours a day.

The physical life of the chopper device was determined to approx. 5-10 years by the supplier EMERSON Germany. Unfortunately an exclusion of unexpected failures by weak material or defect devices cannot be guaranteed with any action. But Carbon Egypt kept the period of analyzer downtime short due to its proactive strategy to keep numerous crucial spare parts on stock on-site and its CDM/QA procedures implemented and executed immediately after a failure occurs. *(see details at Carbon Response 2: Back Up Plans – Spare Parts on Stock On-site; Procedures; EnviNOx® support)*

c) Additional failure handling

Furthermore Carbon Egypt is planning to install a system for a remote control via satellite for EMERSON Germany. This remote system allows EMERSON Germany to immediately take

control over the EnviNOx® and Monitoring system which enables experts to analyze and remedy occurring problem or failure. The expert know-how will lead to a further speeding up of the troubleshooting process and to a minimization of out of function periods of analyzers and other crucial devices.

d) Summary

- Nitric Acid plant and EnviNOx® system in normal operation for the relevant period *(see details at Carbon Response 3);*
- The recurrent analyzer alarm hasn't occurred again until present day and the problem is solved due to consequent improvements in training of service engineers and advanced service contracts with EMERSON Germany;
- Inspection Visits by EMERSON Germany to ensure highest possible quality of the monitoring data through regular calibration/maintenance checks;
- Due to the numerous improvements carried out by Carbon Egypt the analyzer down times have been reduced significantly;
- Additional measures like the configuration of a remote control of the system by the supplier is already in the planning phase;

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Request 2:

The DOE is requested to clarify what systematic measures are in place to ensure the quality of the monitored data during analyser down times.

Carbon response:

Besides the response requested from the DOE Carbon would like to present additional information on systematic measures in place to ensure the quality of the monitored data during analyser down times.

a) Introduction – Back Up Plans to keep the down time as short as possible

- EnviNOx® – automatic DCS system: The EnviNOx® system is designed for automatic operation, so that activities by the operation personnel are not required during normal operation. However, all alarms and any action taken by the operating personnel (events) are automatically logged at the process control system (Alarm & Event List) of the DCS system (Delta V). All log sheets for Alarm & Events are also exported and therefore digital available (Excel Files) and can easily be analysed and evaluated. Malfunction of system components is indicated on the operator console (AFC) in the control room and simultaneously in the EnviNOx® analyzer house (Carbon Egypt) as an alarm. Occurrence of such an alarm requires the operator to immediately take measures to remedy the problem. This is done by informing AFC instrument department and Carbon Egypt. Carbon Egypt is then deciding whether the problem can be fixed immediately by themselves, or whether external support from ENTRAG/EMERSON/UHDE is required. The problem is analyzed in detail with the technology suppliers in cooperation with Carbon Egypt at all events.

- Back Up – EnviNOx® support: Carbon Egypt has contracted the Egyptian ENTRAG Group – the Agent for EMERSON Process Management in Egypt - to execute (1) monthly on-site **Health Checks**. EMERSON Germany has been contracted to execute the (2) quarterly on-site **Inspection Visits**. Furthermore a **24 hours emergency service** and the **Delta V Guardian Support** are covered by the contracts.
  The **monthly Health checks** and the **quarterly Inspection Visits** are to conduct observation of the EnviNOx®® system, the monitoring equipment required for the CDM project and the automated monitoring system. The system components, measurement

devices, calibration works and the automated monitoring system required for the monitoring of the CDM project are covered by these contracts. Health check reports and inspection visit reports are available.

The responsible project managers of Carbon Egypt are carrying out **on-site inspections** on a daily basis and AFC is carrying out a site check of the EnviNOx® system once per shift. Furthermore AFC maintenance department is performing **weekly inspection** including an on-site check of the EnviNOx® system.

Supervision is done based on the daily reports by the technology provider Uhde and Emerson.

- Back Up – Spare Parts on Stock On-site: As a further important part of the back up plan to deal with events like measuring equipment out of service was that Carbon Egypt stocks a comprehensive range of spare part devices on-site. The spare part stock consists basically of 6-month consumables and for two year operation plus some additional parts recommended by EMERSON Germany. It includes inter alia filter elements, valves and pressure controllers for the sample handling system and filter elements, **chopper for the analyzer, analysis cells (crucial part for analyzers)**, flow sensors and several electrical parts for the analyzers.

  The service contracts with ENTRAG and EMERSON guarantee high quality troubleshooting with Emergency visits within 24 hours (as described above).
- Back Up – Procedures: In addition to the quality control and quality assurance procedures according to AFC quality management system and in order to avoid possible failures of the automated monitoring system several CDM/QA procedures are implemented for the project activity. The approach by Carbon Egypt was to ensure immediate response to such alarms/malfunctions respectively in the system.

b) Systematic Measures: Check against operating parameters

In order to ensure the quality of the monitored data during analyzer downtimes Carbon Egypt contracted EMERSON Germany and ENTRAG for regular maintenance & calibration services (as described above) and applied the CDM/QA procedure according to the Project Design Document of "Catalytic N_2O Destruction Project in the Tail Gas of the Nitric Acid Plant of Abu Qir Fertilizer Co."

The procedure how to proceed in cases of analyzer down times is a five-step approach:

(1) Nitric Acid plant in normal operation:
If there is a down time of concentration measurements Carbon Egypt provides suitable operating parameters to demonstrate that the nitric acid plant is operating under normal conditions.

(2) EnviNOx® system in normal operation:
Carbon Egypt provides suitable operating parameters to demonstrate that the EnviNOx® system is operating under normal conditions and has reached normal efficiency.

(3) Correlation check:
The estimation of emission reductions is based on correlation methods, applying the highest historical correlation to the missing parameter (Efficiency of the EnviNOx® system).

(4) Recalculation:
In order to ensure a conservative determination of emission reductions for these days recalculation is based on the minimum historical efficiency of the EnviNOx® system and consequently guarantees a conservative determination of emission reductions.

(5) Check parameters before and after analyzer down time:
Operating parameters are compared with values prior and after the analyser was out of operation or out for maintenance to ensure that those values are within the same range.

The concrete demonstration of how Carbon Egypt provides evidence on the quality of the monitoring data during analyzer down times is shown in *Response 3*.

c) Additional measures to ensure high quality of the monitoring data

Carbon Egypt is planning to install a spare analyzer right beside the currently existing analyzers. This spare analyzer which will run on standby mode while normal operating of the system. The spare analyzer will be functioning as back up system during problems with the analyzer or simulations during maintenance/service activities.

During the scheduled shutdown of the Abu Qir Nitric Acid plant for maintenance activities Carbon has furthermore ordered a comprehensive check of the analyzer system by EMERSON Germany and the exchange of the field instruments of the EnviNOx® system also carried out by EMERSON Germany.

d) Summary

- Comprehensive Back Up plans to keep the down time of analyzers as short as possible;
- Systematic Measures: Check against operation parameters to ensure the quality of the monitored data during analyzer down times *(see details at Carbon Response 3);*
- Additional measures like the installation of a redundant stand-by analyzer set is in the planning phase;

Request 3:

The DOE is requested to clarify how the PP demonstrated that the destruction facility was operational at normal efficiency for the period when the analysers were out of operation (01/07/08 to 12/07/08, and 29/07/08 to 31/07/08).

Carbon response:

Besides the response requested from the DOE Carbon would like to present additional information on how it is demonstrated that the destruction facility was operational at normal efficiency for the period when the analyzers were out of operation.

a) Introduction

From the 1st July 2008 to 12th July 2008 the outlet analyzer was out of operation due to a chopper failure at the analyzer. *(see details at Carbon Response 1)*

From the 29th July 2008 to 31st July 2008 the outlet analyzer was out of operation for regular calibration/maintenance activities for a few hours a day. This so called Inspection Check was performed by EMERSON Germany. *(see details at Carbon Response 1)*

Note: The Nitric Acid plant stopped at 10 pm on the 25th July 2008 and restarted again on 27th July at 7 am due to change of catalyst gauzes.

b) Procedures how to demonstrate that the destruction facility was in normal operation

The destruction facility itself was operational at normal efficiency on 1st July to 12th July 2008, and 29th July to 31st July 2008, due to following conditions:

(1) Nitric Acid plant is in normal operation for the relevant period. This is demonstrated by the following parameters:

(1a) AOR temperature,

(1b) AOR pressure,

(1c) Ammonia Input,

(1d) Nitric acid production

Documents: (a) AFC Delta V daily reports – mdi files, (b) AFC HNO_3 daily production reports and (c) AFC NH_3 log sheets. All relevant documents have already been submitted for verification.

(2) The EnviNOx® system is in normal operation for the relevant periods and achieves normal efficiency. This is demonstrated and documented by the following parameters:

(2a) No significant variations in the EnviNOx® inlet parameters (a) tail gas flow rate, (b) N_2O inlet concentration, (c) NO_x inlet concentration.
Documents: AFC Delta V daily reports – mdi files July 2008 have already been submitted for verification
(2b) Ammonia input required for NO_x reduction: The EnviNOx® system was supplied with the required amount of ammonia for the whole period.
Document: Delta V Charts: NH3 in_26 July to 03 August 2008.mdi; NH3 in_28 June to 15 July 2008.mdi;
(2c) Natural gas input required for high efficient N_2O reduction: The EnviNOx® system was supplied with the required amount of natural gas for high efficient N_2O emission reductions for the whole period.
Document: Delta V Charts: CH4 in_26 July to 03 August 2008.mdi; CH4 in_28 June to 15 July 2008.mdi;
(2d) Temperature increase over the EnviNOx® reactor: As the N_2O reduction taking place in the EnviNOx®® reactor is exothermic and causes a temperature rise, this temperature increase over the EnviNOx® reactor provides evidence that the reactions have taken place and the EnviNOx® system has reached normal performance.
Document: Delta V Charts: Temp_26 July to 03 August 2008.mdi; Temp_28 June to 15 July 2008.mdi;

(3) Correlation Check: Based on the documents described above it is clearly demonstrated by correlation to the missing parameter that the nitric acid plant and the EnviNOx® system have been operated under normal conditions and have reached normal efficiency. The applied approach is fully in compliance with AM0028 vers1 and the registered Monitoring Plan for the project activity.

(4) In order to ensure a conservative determination of emission reductions for these days recalculation is based on the minimum historical efficiency (N_2O removal rate; methane oxidation factor) of the EnviNOx® system and guarantees a conservative determination of project emissions (underestimation of emission reductions).

(5) The check of operating parameters before and after analyzer down time compared with values prior and after the analyser was out of operation or out for maintenance clearly showed that those values are within the same range.

Note: The efficiency of the EnviNOx® system has reached again the "normal" level of 99.5% after the few hours per day during calibration/maintenance activities performed by Emerson Germany, the regular calibration/maintenance activities were finished (identical performance as prior to the measurement simulation) and the chopper failure was solved. This provides evidence that the EnviNOx® system was working at "normal" efficiency during the period of measurement simulation and chopper failure, as the EnviNOx® system is characterized by the stability of the catalyst performance. The manufacturer confirmed that after initial activation of the catalyst any change – if it takes place – occurs slowly and monotonically.
(Document: Statement Uhde on changes in EnviNOx® performance)

c) Summary

- Nitric Acid plant in normal operation for the relevant periods demonstrated by following parameters: AOR temperature; AOR pressure; Ammonia Input; Nitric acid production;
- EnviNOx® system in normal operation for the relevant periods demonstrated by following parameters: No significant variations in the EnviNOx® inlet parameters; Ammonia input, Natural gas input; Temperature increase over the EnviNOx® reactor;
- Correlation Check carried out;
- Recalculation with historic minimum N_2O removal rates;
- Check of values prior and after the analyzer was out of operation carried out;

In case you have any further inquiries please let us know as we kindly assist you.
Yours sincerely,

Kind regards,

Ferdinand Heilig
- Managing Director -