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Verification Report

MGM INTERNATIONAL

**Periodic Verification #2
of the registered CDM project**

**“Sasol Nitrous Oxide Abatement Project”
in South Africa**

UNFCCC 0961-CDMP

Report No. 1288626 – PV02

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**TÜV SÜD Industrie Service GmbH
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Summary: TÜV SÜD Industrie Service GmbH has performed the periodic verification #02 of the registered CDM project: Sasol Nitrous Oxide Abatement Project” in South Africa. The verification is based on requirements of the UN Framework Convention on Climate Change (UNFCCC). In this context, the relevant documents are the "Marrakech Accords" and relevant guidance provided by the EB (Executive Board of the CDM). The management of Sasol Nitro, a Division of Sasol Chemical Industries Limited. as well as MGM International is responsible for the preparation of the GHG emissions data and the reported GHG emissions reductions on the basis set out within the project Monitoring and Verification Plan indicated in the final PDD version 5 dated 31 January 2007. The verifier confirms that the project is implemented as planned and as described in the validated and registered PDD Version 05 – 31/01/2007. Installed equipment essential for generating emissions reductions runs reliably. The monitoring system is in place and is calibrated appropriately and the project is generating emission reduction as a CDM project. The verifier can confirm that the GHG emission reductions are calculated without material misstatements. Our opinion refers to the project’s GHG emissions and resulting GHG emissions reductions reported both determined due to the valid and registered project’s baseline, its monitoring plan and its associated documents. Based on the information we have seen and evaluated we confirm the following statement: <u>Reporting period:</u> From 2007-10-02 to 2008-08-09 <u>Verified emission in the above reporting period:</u> <table><tr><td>Baseline emissions:</td><td>791 136</td><td>t CO₂ equivalents</td></tr><tr><td>Project emissions:</td><td>247 634</td><td>t CO₂ equivalents</td></tr><tr><td><u>Leakage emissions:</u></td><td><u>0</u></td><td><u>t CO₂ equivalents</u></td></tr><tr><td>Emission reductions:</td><td>543 502</td><td>t CO₂ equivalents</td></tr></table>					Baseline emissions:	791 136	t CO ₂ equivalents	Project emissions:	247 634	t CO ₂ equivalents	<u>Leakage emissions:</u>	<u>0</u>	<u>t CO₂ equivalents</u>	Emission reductions:	543 502	t CO ₂ equivalents
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Emission reductions:	543 502	t CO ₂ equivalents														
Work carried out by: - Nikolaus Kröger (project manager) - Konrad Tausche (ghg lead auditor, technical expert) - Yutaka Yoshida (ghg auditor) - Cyprian Fusi (trainee auditor)			Internal Quality Control by: Thomas Kleiser													

Abbreviations

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CO ₂ e	Carbon dioxide equivalent
CR	Clarification Request
DNA	Designated National Authority
DOE	Designated Operational Entity
EB	Executive Board
ER	Emission reduction
FAR	Forward Action Request
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
KP	Kyoto Protocol
IPCC	Intergovernmental Panel on Climate Change
MGM	MGM International
MP	Monitoring Plan
MR	Monitoring Report
PDD	Project Design Document
SASOL	Sasol Nitro, a Division of Sasol Chemical Industries Limited.
SCR	Selective Catalytic Reduction
TÜV SÜD	TÜV SÜD Industrie Service GmbH
UNFCCC	United Nations Framework Convention on Climate Change
VVM	Validation and Verification Manual

Main Documents (referred to in this report)

Methodology	AM0034 version 2		
Sectoral Scope	05, Chemical Industries		
Technical Area	5.1, 5.2, Fertilizers and nitrogen compounds		
Other used Methodologies TOOLS	Tool for the demonstration and assessment of additionality, version 2		
Other used Methodologies TOOLS or EB decisions	Annex 12 of EB51 report clarifying the ways of recalculation of baseline emissions in relation to the campaign length		
Registered PDD	<i>See link below</i>		
Revised Monitoring Plan	-		
		Version	Issued
Published Monitoring Report	<i>See link below</i>	02	Jan, 2009
Revised Monitoring Report	To be uploaded with this report.	07	11 Mar, 2010

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Annex 1: Verification Protocol

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1 INTRODUCTION

1.1 Objective

Sasol Nitro, a Division of Sasol Chemical Industries Limited, has commissioned an independent verification by TÜV SÜD Industrie Service GmbH (TÜV SÜD) of its registered CDM project: “the Sasol Nitrous Oxide Abatement Project”. Verification is the periodic independent review and ex-post determination by the Designated Operational Entity (DOE) of the monitored reductions in GHG emissions during the defined verification period.

The verification work ensures that the project activity is assessed against all applicable CDM requirements. The CDM requirements include the CDM modalities and procedures and subsequent decisions by the CMP and documents released by the CDM Executive Board and available on the UNFCCC CDM website <http://cdm.unfccc.int/index.html>.

The objective of the verification work ensures that the project activity complies with the requirements of paragraph 62 of the CDM modalities and procedures. According to this assessment TÜV SÜD should:

- Ensure that the project activity has been implemented and operated as per the registered PDD “the Sasol Nitrous Oxide Abatement Project” Version 05 – 31/01/2007 including its Annex 4, the Monitoring Plan, and that all physical features (technology, project equipment, monitoring and metering equipment) of the project are in place;
- Ensure that the published MR and other supporting documents provided are complete and verifiable and in accordance with applicable CDM requirements;
- Ensure that actual monitoring systems and procedures comply with the monitoring systems and procedures described in the monitoring plan and the approved methodology
- Evaluate the data recorded and stored as per the “Catalytic reduction of N₂O inside the ammonia burner of nitric acid plants”, AM0034 Version 2.

1.2 Scope

Verification scope is defined as an independent and objective review and ex-post determination by the Designated Operational Entity of the monitored reductions in GHG emissions. The verification is based on the submitted monitoring report and the validated project design documents including its monitoring plan. These documents are reviewed against Kyoto Protocol requirements, UNFCCC rules and associated interpretations.

Following the specific guidance given by the CDM Executive Board on its 44th meeting (see <http://cdm.unfccc.int/EB/044/eb44rep.pdf>, §11-12) TÜV SÜD has, based on the requirements in the Validation and Verification Manual applied a rule-based approach. The principles of accuracy and completeness, relevance, reliability and credibility were combined with a conservative approach to establish a traceable and transparent verification opinion.

The verification follows UNFCCC criteria refer to the Kyoto Protocol criteria and the CDM rules and modalities as agreed in the Bonn Agreement and the Marrakech Accords.

The verification shall consider both quantitative and qualitative information on emission reductions. Quantitative data comprises the monitoring reports submitted to the verifier by the project entity. Qualitative data comprises information on internal management controls, calculation procedures, and procedures for transfer, frequency of emissions reports, review and internal audit of calculations/data transfers.

The verification is not meant to provide any consulting towards the client. However, stated requests for clarifications and/or corrective actions may provide input for improvement of the monitoring activities.

1.3 GHG Project Description

Project activity

The project activity involves the installation of a secondary catalyst to abate N_2O inside the ammonia burner once it is formed. Nitrous Oxide (N_2O) is an undesired by-product gas from the manufacture of nitric acid. Nitrous oxide is formed during the catalytic oxidation of Ammonia. Over a suitable catalyst, a maximum 98% (typically 92-96%) of the fed Ammonia is converted to Nitric Oxide (NO). The remainder participates in undesirable side reactions that lead to the production of Nitrous Oxide, among other compounds. Waste N_2O from nitric acid production is typically released into the atmosphere, as it does not have any economic value or toxicity at typical emission levels. N_2O is an important greenhouse gas which has a high Global Warming Potential (GWP) of 310. The current project activity takes place at two nitric acid plants owned by Sasol Nitro, Sasolburg and Secunda respectively.

This project has been registered as CDM on 25 May 07 by UNFCCC. Prior to the registration at UNFCCC, the baseline campaigns had already been finished at both plants, from 12th June 2006 to 5th March 2007 at Sasolburg and from 29th August 2006 to 23rd March 2007 at Secunda. The first Monitoring Period was from the above day of CDM registration to 1st October 2007. And CERs have already been issued as a result of the last 1st Verification. This 2nd verification has been done for the 2nd Monitoring Period between 2nd October 2007 to 9th August 2008 since Sasolburg finished the 3rd project campaign on 8th December 2008. Prior to starting this Verification, the Monitoring Report was made publicly available at UNFCCC webpage on 2nd February 2009.

Technical description of the project

As stated above, this project is to install the "additional" catalyst called the "secondary" catalyst which is dedicated to abate the concentration of N_2O in the tail gas. As it is not technically easy to make simultaneous measurement of N_2O concentration before & after such catalyst, i.e. baseline and project simultaneously, "baseline campaign" and "project campaigns" are separately done. Baseline Campaign is to be done without having secondary catalyst to determine "Baseline Emission Factor" which is higher ($tN_2O/t100\%HNO_3$). Then, Project Campaigns are to be done with secondary catalyst to determine "Project Emission Factor" which is relatively lower ($tN_2O/t100\%HNO_3$). The difference will be "Emission Reductions" of each project campaigns in principle.

2 VERIFICATION PROCESS

The verification process is based on the approach depicted in the Validation and Verification Manual (VVM). CDM being rules based mechanism; compliance with respect to the CDM criteria and relevant guidance provided by the CMP and the CDM Executive Board is being ensured in accordance with the Validation and Verification Manual (VVM).

Standard auditing techniques have been adopted. The means of verification for the fulfilment of the requirements and reporting are as per the VVM.

The work starts with a contract review and the appointment of team covering the technical scope(s), sectoral scope(s) and relevant host country experience for evaluating the CDM project activity. The principles of consistency and transparency, impartiality, independency and safeguarding against conflicts of interest and confidentiality were considered by the Certification Body and the management of the departement before accepting the verification contract.

Once the monitoring report is published on the UNFCCC website, members of the team carry out the desk review, follow-up actions, resolution of issues identified and finally preparation of the verification report. The prepared verification report and other supporting documents then undergo an internal quality control by the CB “climate and energy” before submission to the CDM-EB.

In order to ensure transparency, assumptions are clearly and explicitly stated; the background material is clearly referenced in Annex II of this report. Project and methodology-specific check-lists and protocol customised are developed for the project. The protocol shows, in a transparent manner, criteria (requirements), the discussion of each criterion by the assessment team and results from verification.

The verification protocol (Annex I) serves the following purposes:

- It organizes, details and clarifies the requirements a CDM project is expected to meet
- It ensures a transparent verification process where the verifier will document how a particular requirement has been proved and the result of the verification.

The findings are the essential part of this verification report, which are summarized on the verification protocol in Annex I. The structure of the Periodic Verification Checklist tables is shown below:

2.1 Verification Team

Studying the existing documentation belonging to this project, it was obvious that the competence and capability of the audit team performing the verification has to cover at least the following aspects:

- Knowledge of Kyoto Protocol and the Marrakech Accords
- Environmental and Social Impact Assessment
- Skills in environmental auditing (ISO 14000, EMAS)
- Quality assurance
- Production process for nitric acid
- Business environment in the acid industry
- Monitoring concepts
- Political, economical and technical framework conditions in host country

According to the technical scopes and experiences in the sectoral or national business environment TÜV SÜD has composed a project team in accordance with the appointment rules of the TÜV SÜD certification body “climate and energy”. The composition of an assessment team has to be approved by the Certification Body (CB) ensuring that the required skills are covered by the team. The CB TÜV SÜD operates four qualification levels for team members that are assigned by formal appointment rules:

- Assessment Team Leader (ATL)
- Greenhouse Gas Auditor (GHG-A)
- Greenhouse Gas Auditor Trainee (T)
- Experts (E)

It is required that the sectoral scope linked to the methodology has to be covered by the assessment team.

The verification team was consisting of the following members:

Name	Qualification	Coverage of technical area(s)	Coverage of sectoral expertise	Host country experience
Nikolaus Kröger	ATL	☑	☑	-
Konrad Tausche	ATL	☑	☑	-
Yutaka Yoshida	GHG-A	☑	☑	-
Cyprian Fusi	T	-	-	☑

Nikolaus Kröger is environmental engineer and expert for emissions monitoring and quality assurance at the department “TÜV SÜD Carbon Management Service”. He is located in the TÜV SÜD Hamburg office and is also engaged as personally accredited verifier in the EU-ETS

serving the Northern German market. Being ghg auditor for sectoral scopes 1, 4, 5, 8, 9, 10, 11, 12, 13 and assessment team leader for CDM and JI projects he has already been involved in several CDM activities with a special focus on industrial non-CO₂ projects. Constitutive on 13 years experience at the department “Environmental Service” he verified many metallurgical plants, refineries, chemical plants, waste treatment and power plants and process engineering in many types of facilities. One of his former focal points had been implementation and calibration of complex automatic Environment-Data-Systems.

Konrad Tausche, the deputy head of the department “TÜV Carbon Management Service” is located in the head quarter in Munich. Because of his long term experience in environmental measurement technique he works as a GHG auditor with a special focus on the scope “Industrial Gases”. The former head of department environmental measurement technique at the Frankfurt office of TÜV SÜD Industrie Service GmbH, supports the team since Dec. 2006. He has an academic background in physical and chemical engineering. An additional economic study was completed with the academic degree of a Master of Business Administration and Engineering (MBA and Eng.). In his experience of more than 15 years he verified a lot of different energy, chemical and incineration plants, emission control and mitigation projects.

Yutaka Yoshida is a production engineer and responsible for the carbon market of TÜV SÜD in Japan. He is working as GHG auditor and is recently involved in the several CDM projects most of which are N₂O (linked to the sectoral scope #5 defined under UNFCCC). He used to work as a project engineer for tyre manufacturing and had comprehensive responsibilities for various capital investment projects including development of new facilities/plants/equipment/products, modernization/refurbishment, production expansion, new factory construction, production improvement, energy conservation projects, total preventative maintenance, environmental legislative compliance, etc. And he received extensive training on all aspects of the flexible mechanism. For this specific project he was responsible for input to the technical aspects within the chemical industry and the contact to technical expert aside of Japanese project developer.

Cyprian Fusi is a GHG auditor (Trainee) at the “Carbon Management Service” in the head office of TÜV SÜD Industrie Service GmbH, Germany, and is a expert for projects in Africa. He holds a Master of Science (Dipl.-Ing) degree in electrical engineering. He has received training in the CDM validation and verification processes and has participated in several CDM project audits and workshops.

2.2 Review of Documents

The monitoring report submitted by the client and additional background documents related to the project performance were reviewed.

The published Monitoring Report was assessed based on the registered PDD and the applied methodology. These documents are listed in the prepended section “Main Documents (referred to in this report)”. The assessment was to verify the completeness and correctness of the data and the information presented in the monitoring report.

The compliance check of the monitoring report with respect to the monitoring plan depicted in the registered PDD and the applied methodology was carried out. Particular attention to the frequency of measurements, the quality of metering equipment including calibration requirements, and the quality assurance and quality control procedures was paid. The evaluation of data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions was also carried out.

A complete list of all documents reviewed supporting the verification is attached as Annex 2 to

this report.

A detailed review of excel spreadsheets in which all applicable hourly data and processed data are provided for the entire monitoring period in its latest revision including multiple detailed cross-checks has been carried out on-site. Any key parameters have been focused with special awareness. Any automatic raw data entry and a proper use of correct default data from external data sources have been proved. Any so called “daily events” - such as facility shut downs or turn away from standard production procedures – have been detected and analyzed with a special focus.

2.3 Follow-up Interviews

An on-site inspection took place at both Sasolburg and Secunda plants of Sasol Nitro, a Division of Sasol Chemical Industries Limited (referred as “Sasol”) in South Africa on 10 – 12 February 2009. The Periodic Verification was carried out with all participants, as listed in Annex 2. And the audit session included reviews of performance records, interviews with representatives of Sasol, collection of measurement data, observation of established practices and documentation of the accuracy of monitoring equipment. The main topics of the interviews are summarized in Table 1 below.

Anecdotaly, Initial Verification was not carried out by any DOE including TÜV SÜD Industrie Service GmbH and the last verification for the 1st monitoring period was the initial and the 1st verification. At the last verification, 259537 CERs has successfully been issued consequently after 5-CARs and 14 CRs were corrected and/or clarified. Please see <http://cdm.unfccc.int/Projects/DB/DNV-CUK1171877538.97/iProcess/TUEV-SUED1200077147.57/view>

Table 1 Interview topics

Interviewed organization	Interview topics
Sasolburg and Secunda plants of Sasol Nitro, a Division of Sasol Chemical Industries Limited	➤ Project design and implementation ➤ Technical equipment and operation ➤ Operation of the decomposition unit ➤ Monitoring plan and Data Handling Protocol ➤ Quality assurance and quality control ➤ Industrial activities ➤ Monitored data (special focus on the key parameter) ➤ Data uncertainty and residual risks ➤ GHG calculation ➤ Data archiving ➤ Compliance with national laws and regulations ➤ Data uncertainty ➤ Data transfer and reporting procedures ➤ Quality management ➤ Performance of maintenance work

2.4 Quality of Evidence to Determine Emission Reductions

The crucial parameter for the determination of GHG emissions are the amount of N₂O emitted to the atmosphere and the produced amount of nitric acid production in order to determine the emission factor PEn for the nth project campaign. As the baseline campaign at each Sasolburg and Secunda plants have already been finished and verified at the last verification, the verifica-

tion team focused specially on the credibility of the data measured for these crucial monitoring parameters during the applicable project campaigns, including the verification of maintenance and/or calibration records.

Among many others the following relevant and reliable evidences have been used by the audit team during the verification process:

- Spreadsheet in an Excel file in which hourly raw data and the ways of data processing are presented in a verifiable way
- Calibration records and maintenance log of the monitoring equipment
- AST report and QAL 3 records on AMS
- Monthly/daily production reports, plant operation log
- External Data like a purchasing document of the primary catalyst
- Screen shot of the data recording system referred as DAS or DCS
- Legislative conformance concerning NO_x-emissions

The data indicated in the above documents have been cross-checked where appropriate, e.g. one in a monthly production report and one in the spreadsheet.

2.5 Resolution of Corrective and Forward Action Requests

The objective of this phase of the verification is to resolve the requests for corrective actions and any other outstanding issues which needed to be clarified for TÜV SÜD's positive conclusion on the GHG emission reduction calculation. The findings raised by TÜV SÜD during the Initial Verification and previous Periodic Verifications were resolved during communications between the client and TÜV SÜD.

New findings and requests raised by TÜV SÜD - if any - were clearly stated in the subsequent on-site audit. To guarantee the transparency of the verification process, the responses to open findings from previous verifications as well as findings from the current periodic verification that were given by Sasol are summarized and documented in the following.

In the following sections the findings of the verification are stated.

The findings from the desk review of the final monitoring report as well as these from interviews during the on-line session and the on-site visit are summarized. A more detailed description can be found in the Verification Protocol in Annex 1.

- 1) Where TÜV SÜD had identified issues that needed clarification or that represented a risk to the fulfilment of the project objectives, a Clarification or Corrective Action Request, respectively, have been issued. The Clarification and Corrective Action Requests are stated, where applicable, in the following sections and are further documented in the Verification Protocol in Annex 1.
- 2) Where Clarification or Corrective Action Request has been issued, the exchanges between the Client and TÜV SÜD to resolve these Clarification or Corrective Action Request are summarized.
- 3) In the context of Forward Action Requests (FAR), risks have been identified, which may endanger the delivery of high quality CERs in the future, i.e. by deviations from standard procedures as defined by the MP. As a consequence, such aspects should receive a special focus during the next consecutive verification. A FAR may originate from lack of data sustaining claimed emission reductions. Forward Action Requests are understood

as recommendation for future project monitoring; they are stated, where applicable, in the following sections and are further documented in the Verification Protocol in Annex 1.

- 4) The final conclusions for the verification subject are presented.

2.6 Internal Quality Control

As final step of verification the final documentation including the verification report and the protocol have to undergo an internal quality control by the CB “climate and energy”, i.e. each report has to be finally approved either by the head of the CB or the deputy. In case one of these two persons is part of the assessment team approval can only be given by the other one.

After the documents have been satisfactorily approved, then only the request for issuance is submitted to the CDM-EB along with the relevant documents.

3 VERIFICATION OF SPECIFIC REQUIREMENTS

3.1 FARs from validation / previous verification

3.1.1 Discussion

Based on the validation report and the initial & the 1st verification report, the verification team identified no material missing steps. There are no remaining issues from the validation and no more remaining issues from the initial & the 1st verification. The project was registered on 25 May 2007 and the 1st issuance of CERs was on 07 Aug 2008.

Please find the validation report at <http://cdm.unfccc.int/Projects/DB/DNV-CUK1171877538.97/view> and the last verification report at <http://cdm.unfccc.int/Projects/DB/DNV-CUK1171877538.97/iProcess/TUEV-SUED1200077147.57/view>.

3.1.2 Open Findings from previous verifications

None

3.1.3 Conclusion

There are no open findings remaining - neither from the validation nor from the previous verifications.

3.2 Project implementation as per the registered PDD

The project is fully implemented according to the description presented in the PDD. The TÜV SÜD assessment team did not find deviation from what were mentioned in PDD as well as from what were done at the last verification, while some improvements had been made as a result of their having the last verification.

3.3 Compliance of the monitoring plan with the monitoring methodology

The monitoring plan is in accordance with the relevant approved methodology applied by the proposed CDM project activity. No revision or deviation to the monitoring plan has been sought and approved by the CDM Executive Board. And since Annex 12 of EB51 report has been issued to assist in the application of version 02 of the approved baseline methodology AM0034, the way of determination as well as the result of the amount of emission reductions has been revised to comply with this decision.

3.4 Compliance of the monitoring with the monitoring plan

The monitoring has been carried out in accordance with the monitoring plan contained in the registered PDD. The reporting procedures, which are described in the monitoring report and which were examined during the on-site visit and desk review, were found to reflect the ones defined by the monitoring plan. All parameters were monitored and determined as in the Monitoring Plan.

Parameters verified for calculation of project emissions

ID	Data variable	Source of data	Recording frequency	Verification
NCSG mgN ₂ O/m ³	N ₂ O Concentration in the stack gas	ABB URAS 14, an infrared gas analyser	Every 2 seconds	✓
VSG m ³ /h	Volume flow rate of the stack gas	Rosemount 485 Annubar & 3051 a pressure differential type gas flow meter at Secunda and an ultrasonic type Flowsick 100 at Sasolburg	Every 2 seconds	✓
TSG °C	Temperature of stack gas	Temperature probe	Every 2 seconds	✓
PSG bar	Pressure of stack gas	Pressure probe	Every 2 seconds	✓
PE_n tN ₂ O	N ₂ O emissions of the nth project campaign	Calculated from NCSG, VSG and OH	At least once after each campaign	✓
OH Hours	Operating hours	Counting hours while hourly average data is considered to be active and cross checked with hand writing log.	Compiled for daily data for entire campaign	✓
NAP tHNO ₃	Nitric acid production (100% concentration)	Coriolis type mass flow meters at both plants, promass 83 at Secunda and Micro Motion at Sasolburg, in addition to daily concentration measurement at internal laboratories.	Compiled for daily data for entire campaign	✓
EF_n tN ₂ O/tHNO ₃	Emissions factor calculated for the nth campaign	Calculated from NCSG, VSG, OH and NAP	After end of each campaign	✓
EF_{mn,a} tN ₂ O/tHNO ₃	Moving average emissions factor	Calculated from EF _n s	After end of each campaign	✓
CL_n tHNO ₃	Campaign length	Calculated from nitric acid production data	After end of each campaign	✓
EF_p tN ₂ O/tHNO ₃	Emissions factor used to determine emissions reductions	Determined from EF _n	After end of each campaign	✓
EF_{min} tN ₂ O/tHNO ₃	Minimum emissions factor after 10 campaigns	Determined from EF _n	After end of 10th campaign	N/A

*Parameters verified for calculation of **baseline emissions***

ID	Data variable	Source of data	Recording frequency	Veri-fication
NCSG_{BC} mgN ₂ O/m ³	N ₂ O Concentration in the stack gas	ABB URAS 14, an infrared gas analyser	Every 2 seconds	✓
VSG_{BC} m ³ /h	Volume flow rate of the stack gas	Rosemount 485 Annubar a pressure differential type gas flow meter at Secunda and an ultrasonic type Flowsick 100 at Sasolburg	Every 2 seconds	✓
TSG °C	Temperature of stack gas	Temperature probe	Every 2 seconds	✓
PSG bar	Pressure of stack gas	Pressure probe	Every 2 seconds	✓
BE_{BC} tN ₂ O	N ₂ O emissions of the nth baseline campaign	Calculated from NCSG, VSG and OH	At least once after baseline campaign	✓
OH_{BC} Hours	Operating hours	Counting hours while hourly average data is considered to be active and cross checked with hand writing log.	Compiled for daily data for entire campaign	✓
NAP_{BC} tHNO ₃	Nitric acid production (100% concentration)	Coriolis type mass flow meters at both plants, promass 83 at Secunda and Micro Motion at Sasolburg, in addition to daily concentration measurement at internal laboratories.	Compiled for daily data for entire campaign	✓
EF_{BL} tN ₂ O/tHNO ₃	Emissions factor for baseline campaign	Calculated from NCSG, VSG, OH and NAP	At the end of baseline campaign	✓
UNC %	Overall measurement uncertainty of the monitoring system	QAL2 report	Once after AMS is commissioned	✓
AFR tHNO ₃	Ammonia gas flow rate to the AOR	Orifice/Rosemount 3051 at Sasolburg and orifice/Honeywell ST 3000 at Secunda	Continuously	✓
AFR_{max} tHNO ₃	Maximum ammonia flow rate	Orifice/Rosemount 3051 at Sasolburg and orifice/Honeywell ST 3000 at Secunda	Once	✓
AIFR kgNH ₃ /kgAIR	Ammonia to Air ratio	Rosemount Annubar at Sasolburg and orifice/Honeywell ST 3000 at Secunda	every hour	✓
CL_{BL} tHNO ₃	Campaign length of baseline campaign	Calculated from NAP _{BC}	At the end of baseline campaign	✓
CL_{NORMAL} tHNO ₃	Normal campaign length	Calculated from historic nitric acid production data	Prior to end of baseline campaign	✓
AIFR_{max} kgNH ₃ /kgAIR	Maximum Ammonia to Air ratio	Rosemount Annubar at Sasolburg and orifice/Honeywell ST 3000 at Secunda Rosemount Annubar at Sasolburg and orifice/Honeywell ST 3000 at Secunda	Once	✓

OT_h °C	Oxidation temperature for each hour	Thermo Couple, type K	Every hour	✓
OT_{NORMAL} °C	Normal operating temperature	Thermo Couple, type K	Once	✓
OP_h bar	Oxidation pressure for each hour	Rosemount 3051S2CD1 at Sasolburg and Honeywell ST3000 at Secunda	Every hour	✓
OP_{NORMAL} bar	Normal oxidation pressure	Rosemount 3051S2CD1 at Sasolburg and Honeywell ST3000 at Secunda	Once	✓
GS_{NORMAL}	Normal gauze supplier for the operation condition campaigns	Historic campaigns	Each campaign	✓
GS_{BL}	Gauze supplier for baseline campaign	Purchasing document	once	✓
GS_{PROJECT}	Gauze supplier for the project campaigns	Purchasing document	Each campaign	✓
GC_{NORMAL}	Gauze composition during the operation campaign	Historic campaigns	Each campaign	✓
GC_{BL}	Gauze composition during baseline campaign	Purchasing document	once	✓
GC_{PROJECT}	Gauze composition during project campaigns	Purchasing document	Each campaign	✓
EF_{REG}	Emissions level set by incoming policies or regulations	Any external news source	occasionally	✓

Parameters verified for calculation of emissions due to leakage:

ID	Data variable	Source of data	Recording frequency	Verification
None	-	-	-	N/A

Parameters based on metering devices are monitored by calibrated equipments in accordance with the procedures established as a part of Quality Management System for CDM monitoring activities, identified like SSBCDM-xxxx at Sasolburg and SECCDM-xxxx at Secunda.

At Sasolbug, All CDM data are monitored continuously on the DeltaV Distributed Control System (DCS) by production personnel in the Control Room. The Instrument Engineer will be responsible for the AMS, data gathering and report generation. Primary data storage is done in a PI database, which form an integral part of the DCS system, at two second intervals. Data are stored in batches of about six days, with only the last five months data continuously available on the DCS.

Scheduled backups of the last four batch files are made on a CD every 24 days and stored in a fireproof safe at the Ammonia plant. This data must be restored on the originating PI database before the data can be viewed or interrogated. With the completion of a campaign, data will be transferred from backup CD's to a DVD to minimize space requirements in the fireproof safe. Data are also stored at 30 second intervals in a secondary database which form part of the Sasol Local Area Network and can be viewed from any LAN point. This second database can also be used for reporting should there be a major failure of the primary database

At Secunda, all CDM data are monitored continuously on the remote located PC (in the plant control room) via the SCADA INTOUCH and ACTIVE FACTORY software package by production personnel in the Control Room. The PC has access rights to the DAS server computer where the raw data from the instruments is written on a continuous basis. The Area Lead-

er/Manager Maintenance - Engineer will be responsible for the AMS, data gathering and report generation. A daily summary report of hourly average data is generated by the DAS and a unique file is written to the common disk drive (analyzer Z:\) every morning at 05:00AM from where it can be viewed by selected personnel only, in this case the Monitoring Engineer and the Plant production Area leader. This file is safeguarded as read only and cannot be modified or changed as only the third party consultant who developed the DAS and AMS has the password to bypass the safeguarding and access the file for modification. All raw data written to the server hard disk drives, which are setup up using five identical hard disk drives in parallel service is available at any time and can be written to DVD format and forwarded to any party concerned.

NCSG (mgN₂O/Nm³)

NCSG (mgN ₂ O/m ³)	Baseline Campaign		1st Project Campaign	2nd Project Campaign	3rd Project Campaign
	Normal-length	Re-calculation			
Sasolburg	3,085	2,865	-	475	-
		3,085	-	-	774
Secunda	1,474	1,474	649	-	-
		1,467	-	614	-

* The values in () are not directly relevant to this monitoring period but are indicated as reference

At both Sasolburg and Secunda plants, N₂O concentration in the stack gas is continuously measured with ABB AO2000-URAS 14, a QAL 1 certified infrared gas analyser and is continuously recorded on DCS/DAS. Since the relative humidity of the tail gas is dry, the measurement has been done on Wet basis consistently to the condition of VSG tail gas flow measurement. This is also affirmed with QAL2 report which clearly states that the gas sampling system has "no cooler, flue gas is dry" in the table A.5.1. The analyzers are maintained in accordance with QAL 2/AST and QAL 3 activities stipulated in EN14181. AST, Annual Surveillance Test was done by SGS Environmental Service who previously provided QAL2 as an accredited laboratory at both plants on 11-12th August 2008. The AST report issued by SGS clearly mentions that the results are accepted with high reliability in order to ensure that QAL2 result have still been maintained and that the current QA/QC procedures comply with QAL3 of EN14181.

While QAL3, i.e. Zero/Span checks have punctually been maintained at both Sasolburg and Secunda plant, there was a considerable deviation found in the results and the verifier requested to apply "AMS downtime" to applicable periods in CAR #1.

Figures listed above are the final results after considering factors specified in the monitoring plan and the applied methodology, e.g. processing with 95% confidence level, campaign length, AMS downtime and QAL3. The verifier has verified the integrity and the consistency of the series of the hourly data from various point of view, e.g. with the graphical analysis and the comparison among them, checks on the data processing/algorithm incorporated, checks on the default/maximum/minimum/average values applied, cross checking with other reports, the compliance to MP and AM34, etc. And the verifier has concluded that the data and the result are sufficiently reliable and comply with the applied methodology as well as the monitoring plan stated in PDD registered.

VSG (Nm³/h)

VSG (Nm ³ /h)	Baseline Campaign	1st Project Campaign	2nd Project Campaign	3rd Project Campaign
	Average in Ful-length			
Sasolburg	71,377	-	68,824	
		-	-	71,360
Secunda	116,409	117,837	-	-
		-	113,941	-

Volume flow rate of the stack gas is continuously measured with Rosemount 485 Annubar a pressure differential type gas flow meter at Secunda and an ultrasonic type Flowsick 100 at Sasolburg and is continuously recorded on DCS/DAS. The measurement has been done on wet basis consistently to the measurement condition of NCSG, N₂O concentration. And thus there theoretically is no overestimates. As mentioned above, the 1st AST, Annual Surveillance Test was done by SGS on 11-12th August 2008 together with N₂O Analyzers in order to maintain the compliance with EN14181. The AST report issued by SGS clearly mentions that the results are accepted with high reliability in order to ensure that QAL2 result have still been maintained.

The measured data are converted to the normalized data at 0 °C, 0.101Mpa (standard atmospheric pressure) with the real-time conversion incorporated in the pressure transmitter at Secunda and the algorithm incorporated in DCS at Sasolburg. These algorithm/function used to make the real time conversion with temperature and pressure data are verified with the specification documents. In addition, QAL2/AST were done with the normalized data between these flow meters installed at both plants and the reference flow meter temporally installed by SGS. The verifier has verified the integrity and the consistency of the series of the hourly data from various point of view, e.g. with the graphical analysis and the comparison among them, checks on the data processing/algorithm incorporated, checks on the default/maximum/minimum/average values applied, cross checking with other reports, the compliance to MP and AM34, etc. And the verifier has concluded that the data and the result are sufficiently reliable and comply with the applied methodology as well as the monitoring plan stated in PDD registered.

UNC (%)

	UNC (%)
Sasolburg	+/- 3.89
Secunda	+/- 4.14

Overall measurement uncertainty of the N₂O emissions monitoring system were determined with QAL2 done by SGS Environmental Service in Feb. 2007. UNC have been determined as the combined uncertainty on N₂O analyzers and flow meters. While QAL3 activities have been maintained, Sasol had AST, Annual Surveillance Test on 11-12th August 2008. The AST report issued by SGS clearly mentions that the results are accepted with high reliability in order to ensure that QAL2 result have still been maintained and that Sasol's QA/QC procedures comply with QAL3 of EN14181.

TSG (°C)

TSG (°C)	Baseline Campaign	1st Project Campaign	2nd Project Campaign	3rd Project Campaign
Sasolburg	210.9	-	228	219
Secunda	95.5	92	90	-

Temperature of stack gas is separately recorded at both Sasolburg and Secunda plants to comply with the requirements of AM0034, while the normalization of above VSG data is not done in the spreadsheet but is done with real-time conversion either on the pressure transmitter or on DCS as mentioned above. Calibration is included in QAL2/AST done by the accredited laboratory since this measuring element is included in the above VSG measurement.

The recording frequency more than every 2 seconds were verified on the screen shot of the data collecting systems.

PSG (MPa)

PSG (MPa)	Baseline Campaign	1st Project Campaign	2nd Project Campaign	3rd Project Campaign
Sasolburg	0.0841	-	0.0846	0.0851
Secunda	0.0868	0.0871	0.0872	-

Pressure of stack gas is separately recorded at both Sasolburg and Secunda plants to comply with the requirements of AM0034, while the normalization of above VSG data is not done in the spreadsheet but is done with real-time conversion either on the pressure transmitter or on DCS as mentioned above. As both Sasolburg and Secunda plant are located in highland, these relatively smaller values are not considered to be abnormal while the standard atmospheric pressure is 0.101 MPa. Calibration is included in QAL2/AST done by the accredited laboratory since this measuring element is included in the above VSG measurement. The recording frequency more than every 2 seconds were verified on the screen shot of the data collecting systems.

BE_{BC}/PE_n (tN₂O)

BE _{BC} /PE _n (tN ₂ O)	Baseline Campaign		1st Project Campaign	2nd Project Campaign	3rd Project Campaign
	Full-length	Re-calculation			
Sasolburg	1,307.8	1,214.6	-	143.0	
		1,307.8	-	-	297.9 ^{*1}
Secunda	825.3	825.3	463.8 ^{*1}	-	-
		821.4	-	331.9	-

^{*1} ERs are not claimed for the entire campaign since this monitoring period include a part of them

The following total N₂O emissions during baseline campaigns and project campaigns calculated from measured data have been calculated in order to determine emission factors.. And these values are the total emissions for the entire length of each campaign while emission reduction will be claimed for a part of the 1st project campaign at Secunda and the 3rd project campaign at Sasolburg since this monitoring period does not include all of them. . In addition, the total uncertainty is not considered in these total emissions while UNC is correctly applied to the determination of baseline emission factors.

OH (hours)

OH (hours)	Baseline Campaign	1st Project Campaign	2nd Project Campaign	3rd Project Campaign
	Full-length			
Sasolburg	5,940	-	4,374	
		-	-	5,394
Secunda	4,810	6,062	-	-
		-	4,747	-

While the applied methodology specifies "production log" and "daily", Sasol does not use their hand writing daily operation logs but precisely determines operating hours based on the process data measured. Sasol is counting hours in which the hourly average of the reactor temperature is above 650 °C during each campaigns. On the other hand, Sasol continues to maintain a hand writing operation log which is to be used for cross checking purpose in case of any unexpected failure on the data. However as far as the verification team reviewed the applicable data in the spreadsheet, these OH values are considered to be determined sufficiently in transparent and conservative way and there was no inconsistency found in comparison to the information recorded in operation logs, e.g. "CDM occurrence book" maintained at Sasolburg.

NAP (tHNO₃)

NAP (tHNO ₃)	Baseline Campaign	1st Project Campaign	2nd Project Campaign	3rd Project Campaign
	Full-length			
Sasolburg	130,069 (114,727)*1		97,016	-
		-	-	121,814
Secunda	172,879 (183,602)*1	215,393	-	-
		-	168,809	-

*1 : Normal Campaign Length

The total amount of nitric acid (100% concentrated) produced during baseline campaigns and project campaigns, using Coriolis type mass flow meters at both plants, promass 83 at Secunda and Micro Motion at Sasolburg, in addition to daily concentration measurement at internal laboratories.

These values are cross-checked with the data from other sources, i.e. storage tank level measurement and delivery data from the weighbridges. These cross-check data are reviewed daily and monthly in the reports to monitor the production results and the production efficiency as one of Sasol's usual activities. In addition to the consistency in the spreadsheet, the verification team also checked monthly values in the spreadsheet to SAP figure in the monthly production report (IRL #28 and #40) and found no inconsistency.

EF (tN₂O/tHNO₃)

EF (tN ₂ O/tHNO ₃)	Baseline Campaign		1st Project Campaign	2nd Project Campaign	3rd Project Campaign
	Normal length	Re-calculation			
Sasolburg	0.00966	0.00897	0.00118	0.00147	-
		0.00966	-	-	0.00245
Secunda	0.00457	0.00457	0.00215	-	-
		0.00455	-	0.00197	-

Emission Factor calculated from measured data. According to Annex 12 of EB 51 Report, the emission factor of the baseline (EF_{BL}) have been correctly recalculated and UNC has been correctly included in the calculation.

EF_{mn,a} (tN₂O/tHNO₃)

Moving average emissions factor calculated as the average EF among project campaign finished.

EF (tN ₂ O/tHNO ₃)	Baseline Campaign	1st Project Campaign	1st - 2nd	1st - 3rd
Sasolburg	NA	NA	0.00133	0.001815
Secunda	NA	NA	0.00206	-

As the EF₂ at Secunda, 0.00197 is smaller than EF_{ma,2}, 0.00206, Sasol has correctly applied 0.00206 to determine the project emissions for the second project campaign at Secunda.

The maximum value and the actual daily average of NAP (tHNO₃/day) – applicable limit to the amount of nitric acid produced

Daily NAP (tHNO ₃ /day)	Designed daily capacity	1st Project Campaign	2nd Project Campaign	3rd Project Campaign
Sasolburg	556.8	(529)	522	527
Secunda	860	819	800	-

As the version 02 of AM0034 refers only annual designed capacity, the applicable description in the page 12/26 of the version 03.3 of AM0034 is applied. The designed capacity at both plants have been sufficiently justified with the old record issued by Uhde, stating 556.8 ton 100% per day as demonstrated capacity in November 1973 at the Sasolburg plant, and with the latest certificate named “Registration in terms of the Atmospheric Pollution Prevention ACT, 1965(ACT

45 of 1965)" dated on 04.Jan 1999, stating 860 t100%HNO₃/d. And these values are consistent to one in PDD.

OT (°C)

OT (°C)	Baseline Campaign	1st Project Campaign	2nd Project Campaign	3rd Project Campaign
Sasolburg	878	N/A	N/A	N/A
Secunda	870	N/A	N/A	-

Oxidation temperature is continuously measured with thermo-couples and transducer, ENDRESS & HAUSER iTEMP TMT 181 at Sasolburg and Honeywell ST3000 at Secunda. To comply with the requirement of the methodology applied, hourly data have been provided in the calculation spreadsheets and the range of variation during baseline campaign has been analyzed comparing to permitted operating conditions determined based on the historic data at Sasolburg (IRL #67) and based on the specification at Secunda (IRL #55) as mentioned about operating conditions below. While the reliability of the measured data is assured with annual calibration records, the verifier has checked the overall integrity with the graphs to see if there was any considerable abnormality found on the shape of the graphs.

For project campaigns, this parameter is not specified to be monitored in AM0034 version 2 while the series of hourly data as the monitoring results have been submitted in the spreadsheets of each project campaign.

OP (MPa)

PSG (MPa)	Baseline Campaign	1st Project Campaign	2nd Project Campaign	3rd Project Campaign
Sasolburg	0.40	N/A	N/A	N/A
Secunda	0.47	N/A	N/A	-

Oxidation pressure is continuously measured with the pressure transducers, Rosemount Smart pressure transmitter model 3051 at Sasolburg and Honeywell ST3000 at Secunda. To comply with the requirement of the methodology applied, hourly data have been provided in the calculation spreadsheets and the range of variation during baseline campaign has been analyzed comparing to permitted operating conditions determined based on the specification at both plant (IRL#54, 56, 57) as mentioned about operating conditions below. While the reliability of the measured data is assured with annual calibration records, the verifier has checked the overall integrity with the graphs to see if there was any considerable abnormality found on the shape of the graphs.

For project campaigns, this parameter is not specified to be monitored in AM0034 version 2 while the series of hourly data as the monitoring results have been submitted in the spreadsheets of each project campaign.

AFR (tNH₃/h)

AFR (tNH ₃ /h)	Baseline Campaign	1st Project Campaign	2nd Project Campaign	3rd Project Campaign
Sasolburg	5.91	N/A	N/A	N/A
Secunda	9.19	N/A	N/A	-

Ammonia gas flow rate to the AOR is continuously measured with orifice and the differential pressure transmitter, Rosemount 3051 at Sasolburg and Honeywell ST3000 at Secunda, calibrated annually. To comply with the requirement of the methodology applied, hourly data have been provided in the calculation spreadsheets and the range of variation during baseline campaign has been analyzed comparing to permitted operating conditions determined based on the specification of the gauze at both plants (IRL #58) as mentioned about operating conditions below. While the reliability of the measured data is assured with annual calibration records, the verifier has checked the overall integrity with the graphs to see if there was any considerable abnormality found on the shape of the graphs including the synchronusness with NAP data.

For project campaigns, this parameter is not specified to be monitored in AM0034 version 2 while the series of hourly data as the monitoring results have been submitted in the spreadsheets of each project campaign.

AIFR (w%)

AIFR (w%)	Baseline Campaign	1st Project Campaign	2nd Project Campaign	3rd Project Campaign
Sasolburg	6.1	N/A	N/A	N/A
Secunda	6.1	N/A	N/A	-

Air flow to the mixer is continuously measured with Rosemount Annubar at Sa-solburg and orifice/Honeywell ST 3000 at Secunda, calibrated annually. To comply with the requirement of the methodology applied, hourly data have been provided in the calculation spreadsheets and the rate AFR divided by hourly air flow is provided in an additional column. And the range of variation during baseline campaign has been analyzed comparing to permitted operating conditions determined based on the specification of the gauze at both plants (IRL #58) as mentioned about operating conditions below. While the reliability of the measured data is assured with annual calibration records, the verifier has checked the overall integrity with the graphs to see if there was any considerable abnormality found on the shape of the graphs including the synchronusness with VSG data.

For project campaigns, this parameter is not specified to be monitored in AM0034 version 2 while the series of hourly data as the monitoring results have been submitted in the spreadsheets of each project campaign.

OT(°C), OP(MPa), AFR(tNH₃/h), AIFR(w%) : operating ranges during “baseline campaigns”

The permitted operating range for OT at Sasolburg was determined based on the data recorded for 5 historic campaigns (IRL #67) while the permitted operating conditions of all the rest at Sasolbug and Secunda were determined based on Uhde's old Technical Document and

confirmation letters from Uhde as well as from Heraeus, due to no availability of hourly data recorded during historic campaigns, i.e. no hourly data recorded in hand writing logs and the record retention period stipulated previously to be 6months only at Secunda.(IRL #68, #69) .

As a result of the comparison, 25% was out of permitted operating ranges at Sasolburg because Sasolburg aimed to maintain relatively higher temperature and higher ammonia flow even in the ranges in accordance with the letter from Uhde, saying that higher than 890 improves production efficiency but also increase platinum losses, and that lower than 860 reduces efficiency drastically.

These 4 parameters are required to be monitored and analyzed for baseline campaign only in accordance with AM0034 version 2.

		OT(°C)	OP(MPa)	AFR(tNH ₃ /h)	AIFR(w%)
Sasolburg	average	878	0.40	5.91	6.1
	Permitted ranges	703 - 884	0.37 – 0.45	- 6.77	- 8.4
	% in above range	75% in the permitted range			
Secunda	average	870	0.47	9.19	6.1
	Permitted ranges	860 - 920	0.25 – 0.50	- 10.6	- 6.3
	% in above range	95% in the permitted range			

GS & GC

Both Sasolburg and Secunda continue to use "FTCplus" supplied by W.C. Heraeus from historic campaigns. The gauze composition historically used have been confirmed with the letters named "Precious Metal Contents" sent from Heraeus in 2006. And the continuation of using the same products have been verified with the purchasing documents issued by Heraeus SA (PTY) Ltd. every campaigns in which the specification including the name of the products and the weight % of the platinum, Rhodium and Palladium are explicitly indicated. GC_{normal} are;

Sasolburg: Pt 54.0 to 56.0 %, Rh 3.6 to 3.9 %, Pd 40.0 to 42.0%.

Secunda: Pt 54.0 to 55.0 %, Rh 3.5 to 3.8 %, Pd 41.0 to 43.0 %

3.5 Assessment of data and calculation of greenhouse gas emission reductions

3.5.1 Complete set of data and use of assumptions and default values

Quality assurance procedures are in place and operational. All involved staff is trained and made aware of the quality assurance procedures.

Sasol has described key positions and roles in the applicable QMS documentation, typically in "Description of personnel involved in the CDM Project activities, SSBCDM-0010" for Sasolburg and "People involved in the CDM project activities at the plant, SECCDM-0005" for Secunda. These procedures include organization charts indicating hierarchical responsibilities from Plant Operator or from Area Managers to Senior Management or to Shareholders for Sasol, as well as descriptions about such responsibilities.

As Raw data is automatically logged in the data acquisition system (hereinafter called "DAS" or "DCS"), plant operators or area managers are to supervise such system in cooperation with monitoring engineers. At both plants, Monitoring engineers have some administrative tasks like entering data into spread sheets and cross checking. The lists of key monitoring equipment for CDM activities have been established to ensure the conformance with the plan, and calibration is carried out and reported in a part of overall QMS certified with ISO 9001.

As a partner for this CDM project, MGM is supposed to be a "Project Developer" which is stated in above procedures, and is to receive above spread sheets from Sasol to process the data measured, to calculate and finally to issue a monitoring report.

The data treatment of the Daily Events was checked by the verifier with intense awareness. It can be confirmed by the verifier that all data were treated according to the implemented routines and found to be correct. All quality control procedures established are functional and able to detect and correct inconsistencies or abnormality.

In the verifiers opinion all assumptions, emission factors and default values could be justified by the project participants and avoid an overestimation of the reported emission reductions.

3.5.2 Review of reported data

Every calculation is based on the underlying approved methodology AM0034, version 2. N₂O emissions are measured with ABB URAS 14, a QAL1 certified infrared gas analyser, Rosemount 485 Annubar a pressure differential type gas flow meter at Secunda and an ultrasonic type Flowsick 100 at Sasolburg. There has been no change and no replacement made on this constitution since Sasol installed them prior to starting the baselines. Since Secunda plant has had a trouble on the gas analyzer as mentioned in the last verification report, they have been well maintained mainly with punctual QAL3, i.e. weekly Zero/Span checks and Shewhart Chart, in addition to AST provided by SGS Netherlands. (With regard to the initial trouble on ABB analyzer found at Secunda plant, baseline emissions has been very conservatively determined as mentioned in the last verification report. For this 2nd monitoring period, the same calculation has been applied without making changes except the adjustment corresponding to each project campaign length compared to the normal campaign length)

Nitric acid produced is measured with Coriolis type mass flow meters at both plants, promass 83 at Secunda and Micro Motion at Sasolburg. And daily measurement of nitric acid concentration at both plants is also punctually maintained at their internal laboratories and has kept providing reliable data to determine the amount of 100% HNO₃ produced. As described in PDD, the amount of nitric acid produced is also measured and calculated with what they call "Mass

Balance” method using level gauges installed on storage tanks as well as the amount shipped measured with weigh-bridges. These data are cross checked daily as well as monthly with the detailed table. As the mass flow meters provide real-time measurement, the data is also used to monitor the efficiency of the nitric acid production process.

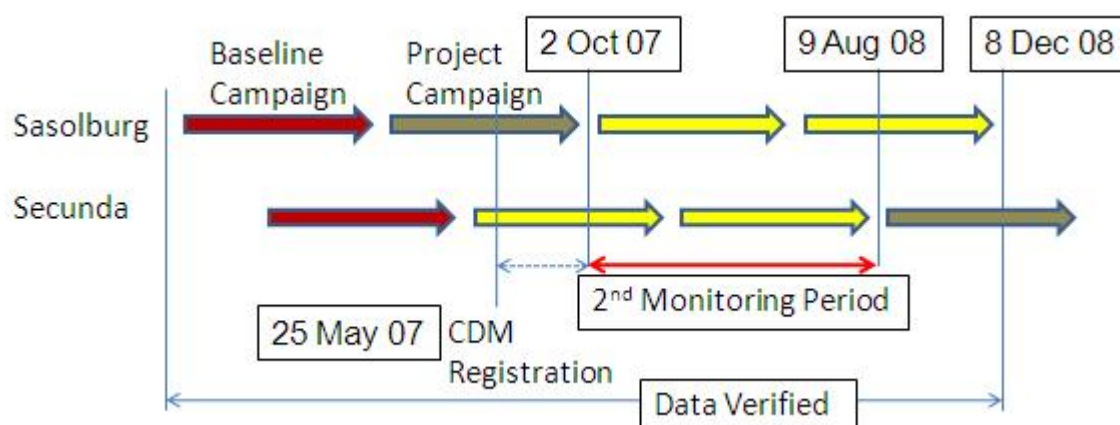
The data acquisition system automatically logs emission data and process data. Then these data are converted to spread sheets to be checked by the monitoring engineers including cross checking referred in PDD to exclude implausible data. MGM creates the final spread sheets to filter and to calculate the baseline emission or the project emission. These data are sufficiently traceable as they accompany sufficient identification like time, day, parameters, etc.

There is no external sourced data affecting the determination of the baseline and the project emission, except some conditional parameters like gauze composition, UNC determined with QAL2 and maintained with AST.

At both this and the last verifications, the verification team reviewed Excel files provided by MGM which is the final outcome to determine the baseline and project emissions. These Excel files consists of both raw and “processed” hourly and daily data, so that the verification team could easily check how raw data were processed and easily create graphs to see the graphical overview. To comply with the demand of the verification team about “sources” of such data in Excel files, Sasol provides e.g. monthly reports which is the table consists of daily data for all key parameters, log books, purchasing documents, data in electronics format which can provide even every second data when the verification team demanded an evidence about “every 2 second recording” for NCSG, VSG, TSG and PSG. Specially monthly reports were the key documents to justify the consistency among various documents as well as to demonstrate the overall integrity. In general, they are thought to be sound and traceable because there was no deficiency found during this and the last verifications, except few discussion on the final Excel files.

3.5.3 Comparison of Emission Reductions verified and estimated in PDD registered

Annual average emission reductions estimated in PDD registered, version 5, 31 January 2007 are 515,837 tCO₂e/year at Sasolburg, 444,485 tCO₂e/year at Secunda and 960,322 tCO₂e/year in total. And this monitoring period, approx for 10 months from 2nd Oct 2007 to 9th August 2008 has produced and 353,620 tCO₂e at Sasolburg and 188,380tCO₂e at Secunda strictly for the 2nd monitoring period indicated below, i.e. the whole 2nd campaign & a part of the 3rd campaign of Sasolburg, and a part of the 1st campaign & the whole 2nd campaign at Secunda..



These emission reductions are equivalent to approx. 424,340 tCO₂e/year at Sasolburg, 226,060 tCO₂e/year at Secunda and 650,400 tCO₂e/year in total which is 32% less than the estimation mentioned in PDD.

The main reason of this significant difference would be N₂O destruction factor which was assumed to be 90% at both plants in PDD however the actual performance are around 80% at Sasolburg and around 54% at Secunda. As Sasol is not satisfied with this actual performance of the secondary catalyst, they were working to improve the performance when the verification team visited Sasol. As actual emission reductions are based on the result of their continuous measurement and as both the results and the ways of monitoring have been successfully verified, this difference has been accepted as reasonable one by the verification team.

4 SUMMARY OF FINDINGS

3 CARs, 4 CRs and 2 FARs have been raised in total.

The findings from the desk review of the final monitoring report and the findings from interviews during the follow up visit are summarized. A more detailed record of these findings can be found in the Verification Protocol attached to this report as Annex 1.

- 1) Where TÜV SÜD identified issues that needed clarification, corrective action or that represented a risk to the fulfillment of the project objectives, a Corrective Action Request or Forward Action Request, respectively, was issued. The Requests are stated, where applicable, in the following sections and are further documented in the Verification Protocol in Annex 1. The verification of the project resulted in 1 Corrective Action Request and 4 Forward Action Requests.
- 2) Where Corrective Action Requests have been issued, the exchanges between the Client and TÜV SÜD to resolve these Requests are summarized.
- 3) In the context of Forward Action Requests, risks have been identified, which may endanger the delivery of high quality CERs in the future, i.e. by deviations from standard procedures as defined by the MP. As a consequence, such aspects should receive a special focus during the next consecutive verification. A FAR may originate from lack of data sustaining claimed emission reductions. Forward Action Requests are understood as recommendation for future project monitoring; they are stated, where applicable, in the following sections and are further documented in the Verification Protocol in Annex 1.
- 4) The final conclusions for verification subject are presented.

The verification findings relate to the project implementation as documented and described in the final monitoring report.

Corrective Action Request #1

While QAL3, i.e. Zero/Span checks have punctually been maintained at both Sasolburg and Secunda plant, there was a considerable deviation found in the results and the verifier requested to apply “AMS downtime” to applicable periods in CAR #1.

Response:

All Zero/Span check records as well as Shewhart charts were submitted to identify all considerable deviations which exceeds UCL/LCL, i.e. 2 sAMS. “AMS downtime” has correctly been applied to applicable periods.

Conclusion:

This finding is closed as all Zero/Span check results were investigated and AMS downtime was applied to applicable weeks. In addition, Forwarded Action Request # 1 has separately been raised below about a risk of re-occurrence in relation to this issue.

Forwarded Action Request #1

Sasol should establish better communication between Sasol and MGM so that the final Excel files should correspond to such incidents like considerable deviation found at weekly Zero/Span Checks more automatically, rather than being requested by a verifier. Because just doing punctual Zero/Span Checks without making "judgement" on deviation found at each Zero/Span Checks or on Control Chart does not ultimately comply with the purpose of QAL3 as well as with the purpose of the monitoring plan stated in PDD.

Response:

Sasol reported that reporting procedures are established and the operation of the control chart at Sasol has been elaborated.

Conclusion:

This finding is forwarded to the next verification.

Forwarded Action Request #2

From SPC, statistical process control point of view, the control limit should be determined based on the actual distribution of the previous results rather than based on specification

Response:

The control limit have been determined as 2 sAMS in accordance with the applicable section in EN14181.

Conclusion:

The verifier agreed that using previous data to determine the control limit does not comply with EN14181. Sasol's new procedures complies with EN14181 and the determination in relation to the above CAR #1 was successfully made in accordance with the result of this finding. This finding is closed.

Clarification Request #1

Few records about Zero/Span check on N2O analyzer at Secunda were not immediately available during the on-site visit.

Response:

All records have been submitted to the verifier.

Conclusion:

This finding is closed.

Clarification Request #2

An evidence of the gauze composition used for the 2nd and the 3rd project campaigns at Sasolburg were not immediately available during the on-site visit.

Response:

The letter, Gauze Composition Specification and Report for 18th Campaign (for the campaign starting about 10th December 2008) at Sasolburg issued by Heraeus S.A. (Pty) Ltd. which indicates FTCplus continuously used from 9th campaign at Sasolburg (IRL #45) has been submitted to the verifier and it has been considered sufficient evidence.

Conclusion:

This finding is closed.

Corrective Action Request #2 & #3

The required calibration frequency on nitric acid flowmeters was not clear. Specific definition or interpretation about “no special maintenance required” in the manufacture’s specification should be identified. No specific maintenance record was found on these flowmeters at Secunda while Sasol’s applicable procedures specify 1 year as their “test frequency”..

Response:

The letter from Endress & Hauser was submitted and what were stated in that letter has been considered reasonable as it was consistent to what the verifier heard from an other Coriolis meters supplier. And Sasol has decided to implement periodic appearance check to comply with the “recommendation” of the manufacture. In accordance with the opinion of Endress & Hauser, no annual check does not impact on the reliability of the data measured previously. In fact, the verifier did not find any abnormality while cross-checking with other data about the amount of nitric acid produced.

Conclusion:

This finding is closed.

Clarification Request #3

Sasol was asked to submit a certificate of Span gas used at Secunda plant in 2007 while the verifier checked the current one, filled 04.08.2008 expired 14.08.09 during the on-site visit.

Response:

The applicable certificates have been submitted.

Conclusion:

This finding is closed.

Clarification Request #4

In the graph of N₂O concentration in tail gas during the 2nd project campaign at Sasolburg plant, there are unusual shape at 2 points where N₂O concentration is apparently lower as below while tail gas flow is not low. Clarification is requested to identify a reason and to discuss possible impact on ER calculation.

Response:

As a result of making graphs of ammonia supply and nitric acid produced, there is no significant increase or decrease of N₂O emissions factor considering simultaneous changes of ammonia supply and nitric acid production. The explanation submitted about bypassed air is consistent to the graphical analysis.

Conclusion:

This finding is closed.

5 PROJECT SCORECARD

The conclusions on this scorecard are based on the monitoring report.

Risk Areas		Conclusions			Summary of findings and comments
		Baseline Emissions	Project Emissions	Emission Reductions	
Completeness	Source coverage/ boundary definition	✓	✓	✓	All relevant sources are covered by the monitoring plan and the boundaries of the project are defined correctly and transparently.
Accuracy	Physical Measurement and Analysis	✓	✓	✓	State-of-the-art technology is applied in an appropriate manner.
	Data calculations	✓	✓	✓	Emission reductions are calculated correctly.
	Data management & reporting	✓	✓	✓	An eligible data management system is in place.
Consistency	Changes in the project	✓	✓	✓	Results are consistent to underlying raw data.

6 VERIFICATION STATEMENT

TÜV SÜD Industrie Service GmbH has performed the 2nd Periodic Verification of the registered CDM project: "the Sasol Nitrous Oxide Abatement Project" due to requirements of the Client set as part of the MP for this specific project. Additionally this verification is based on the currently valid documentation of the UN Framework Convention on Climate Change (UNFCCC). In this context, the relevant documents are the "Marrakech Accords".

The monitoring report is prepared by MGM International and so considered to be responsible for the preparation of the GHG emissions data and the reported GHG emissions reductions on the basis set out within the project Monitoring and Verification Plan indicated in the final PDD dated January 15, 2008.

The verifier can confirm that the GHG emission reductions are calculated without material misstatement. Our opinion relates to the project's GHG emissions and resulting GHG emissions reductions reported and related to the valid and registered project baseline and monitoring, and its associated documents. The verifier also confirms that the monitoring plan of the project activity is in accordance with the applied methodology.

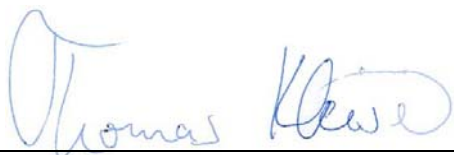
Based on the information we have seen and evaluated TÜV SÜD confirms the following statement:

Reporting period: From 2007-10-02 to 2008-08-09

Verified emission in the above reporting period:

Baseline emissions:	791 136	t CO ₂ equivalents
Project emissions:	247 634	t CO ₂ equivalents
Leakage emissions:	0	t CO ₂ equivalents
Emission reductions:	543 502	t CO ₂ equivalents

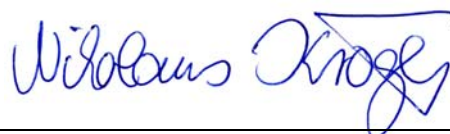
16-03-2010



Thomas Kleiser

Head of the Certification Body
"Climate and Energy"

16-03-2010



Nikolaus Kröger

Assessment Team Leader

Periodic Verification of the CDM Project:
“Sasol Nitrous Oxide Abatement Project”



Industrie Service

ANNEX 1: PERIODIC VERIFICATION PROTOCOL

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Annex 1: Verification Protocol

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Table 1: Data Management System/Controls

The project operator's data management system/controls are assessed to identify reporting risks and to assess the data management system's/control's ability to mitigate reporting risks. The GHG data management system/controls are assessed against the expectations detailed in the table. A score is assigned as follows:

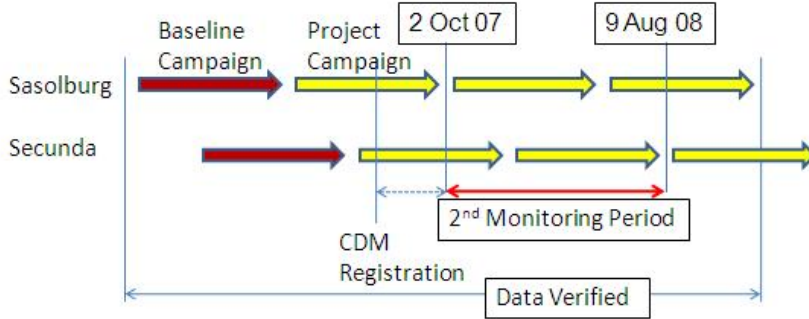
- Full - all best-practice expectations are implemented.
- Partial - a proportion of the best practice expectations is implemented
- Limited - this should be given if little or none of the system component is in place.

Expectations for GHG data management system/controls	Score	Verifiers Comments (including <i>Forward Action Requests</i>)
1. Defined organisational structure, responsibilities and competencies		
1.1. Position and roles <i>Position and role of each person in the GHG data management process is clearly defined and implemented, from raw data generation to submission of the final data. Accountability of senior management must also be demonstrated.</i>	Full	Sasol Nitro (hereinafter called "Sasol") is a division of Sasol Chemical Industries Limited, a private company incorporated under the laws of the Republic of South Africa. Sasol Chemical Industries Limited is part of the Sasol group of companies (the Sasol Group) whose activities are coordinated by the holding company Sasol Limited, founded in 1950. Sasol has described key positions and roles in the applicable QMS documentation, typically in "Description of personnel involved in the CDM Project activities, SSBCDM-0010" for Sasolburg and "People involved in the CDM project activities at the plant, SECCDM-0005" for Secunda. These procedures include organization charts indicating hierarchical responsibilities from Plant Operator or from Area Managers to Senior Man-

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		agement or to Shareholders for Sasol, as well as descriptions about such responsibilities. As Raw data is automatically logged in the data acquisition system (hereinafter called “DAS” or “DCS”), plant operators or area managers are to supervise such system in cooperation with monitoring engineers. At both plants, Monitoring engineers have some administrative tasks like entering data into spread sheets and cross checking. The lists of key monitoring equipment for CDM activities have been established to ensure the conformance with the plan, and calibration is carried out and reported in a part of overall QMS certified with ISO 9001.
1.2. Responsibilities <i>Specific monitoring and reporting tasks and responsibilities are included in job descriptions or special instructions for employees.</i>	Full	As an external partner, MGM is supposed to be a “Project Developer” which is stated in above procedures, and is to receive above spread sheets from Sasol to process the data measured, to calculate and finally to issue a monitoring report. Though Management Review is not separately done for CDM activities, CDM monitoring activities have basically been incorporated in Sasol's quality management system including for the document control.
1.3. Competencies needed <i>Competencies needed for each aspect of the GHG determination process are analysed. Personnel competencies are assessed and training programme implemented as required.</i>	Full	All competences and capabilities are covered by the persons working directly on the CDM activities with relationship to the CDM activity. Calibration, e.g. Periodic Zero/Span check on N2O analyzer as well as Maintaining Shewhart Chart are done by qualified personnel who are working for an internal independent laboratory e.g. INFRACHEM at Sasolburg since such tasks require specific knowledge and experiences including statistics. At Secunda, Zero/Span check service is provided monthly by instrumental personnel and by an external instrument service company called Rand Instrument in addition.

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2. Conformance with monitoring plan		
2.1. Reporting procedures <i>Reporting procedures should reflect the monitoring plan content. Where deviations from the monitoring plan occur, the impact of this on the data is estimated and the reasons justified.</i>	Full	The data management system and all reporting procedures comply with the monitoring plan described in PDD. The latest monitoring report NO.2 version 02 dated January 2009 has been issued for the 2nd monitoring period from 2nd October 2007 to 9th August 2008 after finishing the 3rd project campaign at Sasolburg. , in which Emission Reductions produced during whole the 2nd project campaign and the first 4 months of the 3rd project campaign at Sasolburg, and the last 3 months of the 1st project campaign and the whole 2nd campaign at Secunda. Please see “2nd Monitoring Period” below.  CERs for the 1st Monitoring Period have already been issued. And the Monitoring Report for this 2nd period was made publicly available on Monday 2nd Feb. 2009 prior to have the on-site visit on 10th-12th Feb. 2009. Please see http://cdm.unfccc.int/Projects/DB/DNV-CUK1171877538.97/view

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		Basically Baseline Emissions applied are identical between the 1st and the 2nd Monitoring Periods, though the baseline emission factor has been re-calculated to adjust them based on the normal campaign length, 114,727 t100%HNO3 at Sasolburg and 183,602 t100%HNO3 at Secunda. <table><tr><td>NAP(t₁₀₀ %HNO₃)</td><td>Baseline cam- paign</td><td>1st Project campaign</td><td>2nd Project campaign</td><td>3rd Project campaign</td></tr><tr><td>Sasolb.</td><td>130,069</td><td>(110,625)</td><td>97,016</td><td>121,814</td></tr><tr><td>Secunda</td><td>172,879</td><td>215,393</td><td>168,809</td><td>--</td></tr></table> As the 2nd project campaigns at both Sasolburg and Secunda are shorter than the normal campaign length, the baseline emission factors have been re-calculated properly.	NAP(t ₁₀₀ %HNO ₃)	Baseline cam- paign	1 st Project campaign	2 nd Project campaign	3 rd Project campaign	Sasolb.	130,069	(110,625)	97,016	121,814	Secunda	172,879	215,393	168,809	--
NAP(t ₁₀₀ %HNO ₃)	Baseline cam- paign	1 st Project campaign	2 nd Project campaign	3 rd Project campaign													
Sasolb.	130,069	(110,625)	97,016	121,814													
Secunda	172,879	215,393	168,809	--													
2.2. Necessary Changes <i>Necessary changes to the monitoring plan are identified and changes are integrated in local procedures as necessary.</i>	Full	No necessary changes were identified.															
3. Application of GHG determination methods																	
3.1. Methods used <i>There are documented description of the methods used to determine GHG emissions and justification for the chosen methods. If applicable, procedures for capturing emissions from non-routine or exceptional events are in place and implemented.</i>	Full	The applied methods are thought to comply with one stated both in PDD and the applied methodology. N2O emissions are measured with ABB URAS 14, a QAL1 certified infrared gas analyser, Rosemount 485 Annubar a pressure differential type gas flow meter at Secunda and an ultrasonic type Flowsick 100 at Sasolburg. There has been no change and no replacement made on this constitution since Sasol installed them prior to starting the baselines. Since Secunda plant has had a trouble															

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		on the gas analyzer as mentioned in the last verification report, they have been well maintained mainly with punctual QAL3, i.e. weekly Zero/Span checks and Shewhart Chart, in addition to AST provided by SGS Netherlands. (With regard to the initial trouble on ABB analyzer found at Secunda plant, baseline emissions has been very conservatively determined as mentioned in the last verification report. For this 2nd monitoring period, the same calculation has been applied without making changes except the adjustment corresponding to each project campaign length compared to the normal campaign length) Nitric acid produced is measured with Coriolis type mass flow meters at both plants, promass 83 at Secunda and Micro Motion at Sasolburg. And daily measurement of nitric acid concentration at both plants is also punctually maintained at their internal laboratories and has kept providing reliable data to determine the amount of 100% HNO₃ produced. As described in PDD, the amount of nitric acid produced is also measured and calculated with what they call "Mass Balance" method using level gauges installed on storage tanks as well as the amount shipped measured with weigh-bridges. These data are cross checked daily as well as monthly with the detailed table. As the mass flow meters provide real-time measurement, the data is also used to monitor the efficiency of the nitric acid production process.
3.2. Information/process flow <i>An information/process flow diagram, describing the entire process from raw data to reported totals is developed.</i>	Full	The data acquisition system automatically logs emission data and process data. Then these data are converted to spread sheets to be checked by the monitoring engineers including cross checking referred in PDD to exclude implausible data.

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		MGM creates the final spread sheets to filter and to calculate the baseline emission or the project emission. These data are sufficiently traceable as they accompany sufficient identification like time, day, parameters, etc. There is no external sourced data affecting the determination of the baseline and the project emission, except some conditional parameters like gauze composition, UNC determined with QAL2 and maintained with AST.
3.3. Data transfer <i>Where data is transferred between or within systems/spreadsheets, the method of transfer (automatic/manual) is highlighted - automatic links/updates are implemented where possible. All assumptions and the references to original data sources are documented.</i>	Full	Besides the information flow indicated above no further data transfer is required.
3.4. Data trails <i>Requirements for documented data trails are defined and implemented and all documentation are physically available.</i>	Partial	At this and the last verifications, the verification team reviewed Excel files provided by MGM which is the final outcome to determine the baseline and project emissions. These Excel files consists of both raw and “processed” hourly and daily data, so that the verification team could easily check how raw data were processed and easily create graphs to see the graphical overview. To comply with the demand of the verification team about “sources” of such data in Excel files, Sasol provides e.g. monthly reports which is the table consists of daily data for all key parameters, log books, purchasing documents, data in electronics format which can provide even mili-second data when the verification team demanded an evidence about “every 2 second recording” for NCSG, VSG, TSG and PSG. Especially monthly reports were the key documents to justify the consistency among various documents as well as to dem-

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	onstrate the overall integrity. In general, they are thought to be sound and traceable because there was no deficiency found during this and the last verifications, except few discussion on the final Excel files. At the both plants, the overall QMS certified with ISO 9001 covers CDM activities. In addition to existing procedures, several additional procedures have been developed specifically for CDM activities. At Sasolburg, CDM activities seems more separated from other routine to ensure the integrity. E.g. a special operation log book developed to identify the running status of the plant as well as to log events or incidents like breakdowns which are considered to impact on CDM activities, CDM reports issued at the end of each project campaigns, comprehensive calibration records for CDM monitoring equipment, etc. Specially the CDM operation log looks to be a good attempt. Though both factories are implementing weekly Zero/Span check on N2O analyzer very punctually, the verifier found considerable deviation in the results. <u>Corrective Action Request #1.</u> “Downtime” should be applied for project emission calculation in case significant deviation which exceeds UCL/LCL in the Shwhart chart is found at periodic Zero/Span checks. Please check all the results through the whole this Monitoring period, as there can be another considerable deviation in addition to 22nd Jan. 2008 at Secunda. And please apply the maximum value during the project campaign for the period considered as AMS downtime. In case Sasol can not identify a specific rea-
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	son how or why such deviation took place, please consider a whole week(s) as “downtime” from the last sound Zero/Span check to the next Zero/Span check at which the deviation was settled. Please recalculate project emissions too. <u>Forwarded Action Request #1.</u> Please establish better communication between Sasol and MGM so that the final Excel files should correspond to such incidents like big deviation found at weekly Zero/Span Checks more automatically, rather than being requested by a verifier. Because just doing punctual Zero/Span Checks without making “judgement” on deviation found at each Zero/Span Checks or on Control Chart is not sufficient to comply with the purpose of QAL3 as well as with the purpose of the monitoring plan stated in PDD. <u>Forwarded Action Request #2.</u> Please determine UCL & LCL on the Shewhart Charts at both plants with actual standard deviation calculated with actual data. Currently they were determined with the specification. It is okay when we start a Control Chart at the beginning, because of insufficient data. However, since Control Chart is a statistical tool in order to watch if the behaviour of measurement characteristics is statistically normal or abnormal, UCL/LCL should represent actual distribution. So far, this issue does not impact on emission reduction calcu-
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		lation because Shewhart Chart is just a tool to find a possible abnormality before having actual problem, i.e. its' more or less a preventive control. But this is probably one of reasons of above CAR #1 & FAR #1. <u>Clarification Request #1.</u> Please submit copies of Zero/Span check records as well as Shewhart Charts for the 1st and the 2nd project campaigns at "Secunda", as some applicable Zero/Span check records were not immediately found at the on-site visit. Specially Shewhart Chart for the 1st project campaign is to be submitted since it was not provided during the on-site visit.
4. Identification and maintenance of key process parameters		
4.1. Identification of key parameters <i>The key physical process parameters that are critical for the determination of GHG emissions (e.g. meters, sampling methods) are identified.</i>	Full	As mentioned at the section 3.1 above, the most critical parameters for the determination of GHG emissions are N₂O concentration measurement and flow volume measurement in the tail gas as the methodology requires to use the guidance document EN14181, as well as the measurement of the amount of nitric acid. Both gas analyzers and flow meters are not thought to be "maintenance free" equipment at all and we usually have to expect to have bigger uncertainties including significant drift even in few weeks or just bigger repeatability/reproducibility in general. In fact, Sasol had an actual problem on the credibility of N₂O concentration data at the baseline campaign. And thus the importance of QAL3 is well recognized by Sasol and is punctually maintained. In addition, cross checks on the

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		amount of nitric acid produced daily measured on mass flow meters are punctually done with data from the level measurement in the storage tanks + shipping data originally from weigh-bridges at both factory. The gauze composition and its' supplier used for the 1st and the 2nd project campaigns at Secunda are verified as identical to one used for the baseline campaign, with the letters from Heraus South Africa dated on 26th Feb. 07, 14th Nov. 07 and 7th Jul. 09. <u>Clarification Request #2.</u> Please submit evidences of the gauze composition and its' supplier used for the 2nd and 3rd project campaigns at Sasolburg plant.
4.2. Calibration/maintenance <i>Appropriate calibration/maintenance requirements are determined.</i>	Partial	Both plants have developed independent procedures for CDM activities as a part of their QMS, in which manufactures, types, IDs, ranges, required calibration frequencies are clearly identified in the "list of instruments" At Sasolburg plant, calibration records are punctually maintained. As mentioned at the section 3.4, Sasolburg plant has developed a separated record control on CDM monitoring equipment. Annual calibration records are also well maintained and certificates of external calibration on "master" equipment are filed together. And the verification team found no deficiency or no out of tolerance value during this and the last verifications.

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	With regard to tail gas measurement, i.e. N2O analyzers and flow meters, Sasol had AST, Annual Surveillance Test on 11-12th August 2008. The AST report issued by SGS clearly mentions that the results are accepted with high reliability in order to ensure that QAL2 result have still been maintained and that QA/QC procedures comply with QAL3 of EN14181. <u><i>Corrective Action Request #2.</i></u> Though Coriolis type mass flow meters for nitric acid are considered having long-life and “relatively maintenance-free”, it is not permanently maintenance-free as long as the verifier talked to an agent of the manufacture in Japan. E.g. the stiffness of measurement tube could be changed because of corrosion or vibration. An agent also said, “Its’ life depends on applications and users are to determine it.” So, please establish practical calibration frequency which can be considered good industrial practice. Since more than 2 years have passed since installation, please investigate the credibility on the measured data in case such calibration frequency should be more frequent than every 3 years. <u><i>Corrective Action Request #3.</i></u> At Secunda plant, “test” frequency for the nitric acid mass flow meter is defined as “yearly” however there is no record found. I.e. Secunda plant does not comply with their internal procedures. This possibly is not limited to nitric acid mass flow meter. Then, please check consistency between “required” and
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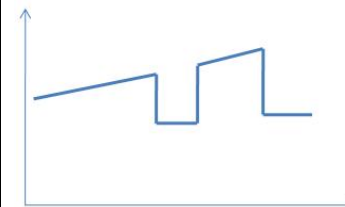
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		“done” on “all” monitoring equipment listed. And, if inconsistent, please renew required calibration frequency based on manufactures' recommendation or Sasol's past experiences which can be considered as a good industrial practice. And please justify that the previous data recorded at Secunda plant still comply with such renewed calibration frequency since the start of the baseline campaign. If Secunda can not justify the compliance for the previous data, i.e. if the previous calibration frequency done is considered less than needed, please make conservative treatment on the previous data. And please submit all calibration records made at Secunda plant in 2007 and 2008. <u>Clarification Request #3.</u> Please submit a certificate of Span gas used at Secunda plant in 2007. (Although I checked the current one, filled 04.08.2008 expired 14.08.09)
5. GHG Calculations		
5.1. Use of estimates and default data <i>Where estimates or default data are used, these are validated and periodically evaluated to ensure their ongoing appropriateness and accuracy, particularly following changes to circumstances, equipment etc. The validation and periodic evaluation of this is documented.</i>	Full	(Baseline Emissions) As mentioned in the last verification report for the 1st Monitoring Report, N2O analyser had become unstable at the beginning of the baseline campaign at Secunda, and IPCC default 4.5 kg N2O/tHNO3 is applied to supersede unreliable measured data. In addition, as N2O concentration is thought to be lower than the IPCC default for the very beginning of the baseline campaign, the lowest assumption measured in the first week is applied to such period instead of IPCC default, “as the last meas-

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	ured value". The auditor has accepted these applications as well conservative interpretation of the monitoring plan in the registered PDD as well as the applied methodology. (Project Emissions) The verification team has checked the data from various points of view, e.g. spot checks on the consistency between the final Excel files and the sources of sampled hourly or daily data, shape of charts, spot checks on how default values are applied, etc. The reactor temperature whether above 650 C or not is used to determine if the plant is operated or not. And if the N2O concentration or the tail gas flow is nul or 0 while the plant is operated, monitoring system is considered "AMS down"="downtime". In addition, MGM manually put "plant down" and/or "AMS down" corresponding to any abnormal values found or to additional information sourced from logs and records where necessary. And MGM applied higher values between the last measured data or IPCC defaults values while "AMS down" hours. <u>Clarification Request #4.</u> As long as the verifier draw the graph of N2O concentration in tail gas during the 2nd project campaign at Sasolburg plant, it has unusual shape at 2 points where N2O concentration is apparently lower as below while tail gas flow is not low. As the supply of NH3 and Air to the reactor as well as the amount of
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	nitric acid produced seem low too during these period, there can be simple reasons. And there possibly be no negative impact on conservativeness as the graph of hourly emission factor is rather lower during these periods. However, please clarify what happened including the reason why the tail gas flow can be still high during these period.  As reported in the last verification report, N₂O concentration for the last 1 month during the 1st project campaign had been apparently higher. And the reason was explained as physical alignment error on the primary gauze because of an accidental movement. The verification team accepted it as higher project emissions would result in less emission reductions in addition to the sound maintenance on N₂O analyzer verified. In addition, as Sasol is not happy with the performance of the secondary catalyst used during this Monitoring Period, they are now testing a new secondary catalyst and the performance looked very good although the result will be one of the issues at the next verification.
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5.2. Guidance on checks and reviews <i>Guidance is provided on when, where and how checks and reviews are to be carried out, and what evidence needs to be documented. This includes spot checks by a second person not performing the calculations over manual data transfers, changes in assumptions and the overall reliability of the calculation processes.</i>	Full	Sasol has developed various documented procedures specifically for CDM activities listed in “CDM Project Document Index” which are as aforementioned an integral part of the certified quality management system (ISO 9001). The overall management system covers the issue of management review for all activities as required for system certification as the scope of the QMS includes nitric acid production.
5.3. Internal validation and verification <i>Internal verifications include the GHG data management systems, to ensure consistent application of calculation methods.</i> <i>Data reported from internal departments should be validated visibly (by signature or electronically) by an employee who is able to assess the accuracy and completeness of the data. Supporting information on the data limitations, problems should also be included in the data trail.</i>	Full	Internal validation and verification in a sense of daily and monthly checks are done in accordance with tasks and responsibilities defined in several QMS procedures. In addition, cross checks are done with specific procedures developed as a part of their QMS structure.
5.4. Data protection measures <i>Data protection measures for databases/spreadsheets should be in place (access restrictions and editor rights).</i>	Full	In addition to some physical access control mentioned below as IT system, their hierarchical roles and responsibilities defined in their QMS documents like “People involved in the CDM project activities at the plant” at Secunda and “Description of personnel involved in the CDM Project activities” at Sasolburg is helping the system.
5.5. IT systems <i>IT systems used for GHG monitoring and reporting should be tested and documented.</i>	Full	At Secunda, all CDM data are monitored continuously on the remote located PC (in the plant control room) via the SCADA INTOUCH and ACTIVE FACTORY software package by production personnel in the Control Room. The PC has access rights to the DAS server computer where the raw data from the instruments is written on a continuous basis. The Area Leader/Manager Maintenance - Engineer will be responsible for the AMS, data gathering and report generation. A daily summary

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	report of hourly average data is generated by the DAS and a unique file is written to the common disk drive (analyzer Z:\) every morning at 05:00AM from where it can be viewed by selected personnel only, in this case the Monitoring Engineer and the Plant production Area leader. This file is safeguarded as read only and cannot be modified or changed as only the third party consultant who developed the DAS and AMS has the password to bypass the safeguarding and access the file for modification. All raw data written to the server hard disk drives, which are setup up using five identical hard disk drives in parallel service is available at any time and can be written to DVD format and forwarded to any party concerned. At Sasolbug, All CDM data are monitored continuously on the DeltaV Distributed Control System (DCS) by production personnel in the Control Room. The Instrument Engineer will be responsible for the AMS, data gathering and report generation. Primary data storage is done in a PI database, which form an integral part of the DCS system, at two second intervals. Data are stored in batches of about six days, with only the last five months data continuously available on the DCS. Scheduled backups of the last four batch files are made on a CD every 24 days and stored in a fireproof safe at the Ammonia plant. This data must be restored on the originating PI database before the data can be viewed or interrogated. With the completion of a campaign, data will be transferred from backup CD's to a DVD to minimize space requirements in the fireproof safe. Data are also stored at 30 second intervals in a secondary database which form part of the Sasol Local Area Network and can be viewed from any LAN point. This second da-
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		tabase can also be used for reporting should there be a major failure of the primary database.
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Table 2: GHG calculation procedures and management control testing

Identification of potential reporting risk	Identification, assessment and testing of management controls	Areas of residual risks
Potential reporting risks based on an assessment of the emission estimation procedures can be expected to occur in the following fields of action: 1. raw data collection 2. calculation methods Key source data applicable to the project assessed are hereby: • Metering records • Laboratory/analytical data • Accounting records. Appropriate calibration and maintenance of equipment resulting in a high accuracy of data supplied should be in place. It is hereby needed to focus on those risks that impact the accuracy, completeness and consistency of the reported data. Risks are weaknesses in the GHG calculation systems and may include: ➤ manual transfer of data/manual calculations	Regarding the potential reporting risks identified in the left column the following mitigation measures have been observed during the document review and the on-site mission. Calculation methods: The use of excel files is requiring a detailed check of correct transfer of algorithms into this format and a carefully treatment of all “copy and paste” actions to avoid any overwriting of cells. Detailed reviews of any excel spreadsheet of Sasol/MGM’s Workbooks for both baseline campaigns and project campaigns, and for both Sasolburg and Secunda. Any key parameters had been focused in special awareness. Any automatic raw data entry and a proper use of correct default data had been proved. Calibration and Maintenance: Spot checks have been made in order to get proofs for the realization of calibration measures	

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Identification of potential reporting risk	Identification, assessment and testing of management controls	Areas of residual risks
➤ position of metering equipment ➤ unclear origins of data ➤ accuracy due to technological limitations	as required. Accuracy Spot checks have been made in order to find out level of accuracy. All installed measuring devices are on a high level standard. There are no risks of missing information on data accuracy.	

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Table 3: Detailed audit testing of residual risk areas and random testing

Areas of residual risks	Additional verification testing performed	Conclusions and Areas Requiring Improvement (including <i>Forward Action Requests</i>)
No significant residual risks	-	-

Table 4: Compilation of open issues

Corrective and Forward Action Requests by audit team	Summary of project owner response	Audit team conclusion
3.4. <u><i>Corrective Action Request #1.</i></u> “Downtime” should be applied for project emission calculation in case significant deviation which exceeds UCL/LCL in the Shewhart chart is found at periodic Zero/Span checks. Please check all the results through the whole Monitoring period, as there can be another considerable deviation in addition to 22 nd Jan. 2008 at Secunda. And please apply the maximum value during the project campaign for the period considered as AMS downtime. In case Sasol can not	As requested, for periods during which the deviation in the calibration value falls outside the permitted range (2 times sAMS for either zero or span), the instrument will be considered out of control and the reading from the analyzer will be replaced by the maximum value obtained during the campaign. At Secunda plant the maximum value during the campaign was applied from January 12, 2008 to January 22, 2008.	☒ All applicable zero/span check results were investigated and AMS downtime was applied to applicable days or weeks.

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Corrective and Forward Action Requests by audit team	Summary of project owner response	Audit team conclusion
identify a specific reason how or why such deviation took place, please consider a whole week(s) as “downtime” from the last sound Zero/Span check to the next Zero/Span check at which the deviation was settled. Please recalculate project emissions too.	In case of Sasolburg an unplanned plant outage on September 26, 2008 caused a mal function of the AMS (the NDIR unit, specifically). Corrective actions were taken in more than one occasion (problem couldn’t be solved at first attempt on September 29) until malfunction was resolved. Downtime criterion was applied during complete duration on this event, which went from September 26 to October 9. On October 30 and 31 the analyzer was off line and for those days downtime criterion was applied also. Project emission calculations for the second project campaign at Secunda plant and for third project campaign at Sasolburg plant were recalculated. Both documents were sent to the auditor.	
3.4. <u>Forwarded Action Request #1.</u> Please establish better communication between Sasol and MGM so that the final Excel files should correspond to such incidents like big deviation found at weekly Zero/Span Checks more automatically, rather than being requested by a verifier. Because just doing punctual Zero/Span Checks without making “judgement” on deviation found at each Zero/Span Checks or on Control Chart is not sufficient to comply with the purpose of QAL3 as well as with the purpose of the monitoring plan stated in PDD.	Actions are taken to include descriptions of any incident related to the AMS on the periodical reports sent to the Developers. Furthermore, QAL3 activities are being standardized with the best practices from each plant and the level of awareness related to this type of incidents has been raised.	To be forwarded to the next verification to check the actual performance..

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Corrective and Forward Action Requests by audit team	Summary of project owner response	Audit team conclusion
3.4. <u>Forwarded Action Request #2.</u> Please determine UCL & LCL on the Shewhart Charts at both plants with actual standard deviation calculated with actual data. Currently they were determined with the specification. It is okay when we start a Control Chart at the beginning, because of insufficient data. However, since Control Chart is a statistical tool in order to watch if the behaviour of measurement characteristics is statistically normal or abnormal, UCL/LCL should represent actual distribution. So far, this issue does not impact on emission reduction calculation because Shewhart Chart is just a tool to find a possible abnormality before having actual problem, i.e. its' more or less a preventive control. But this is probably one of reasons of above CAR #1 & FAR #1.	As per EN14181 (the specified reference for QA/QC of AMS on AM 0034) the compliance limits are set based on the instrument's standard uncertainty as calculated by the manufacturer (based on performance specifications). The USL/LSL (Upper and Lower Specification limits) are set then as 2 times s AMS for both zero and span. The instrument is considered within control inside these limits; if the drift value falls outside the mentioned range the instrument will be considered out of control and the reading from the analyzer will be replaced by the maximum value obtained during the campaign. Furthermore, following the Auditor's advice, the plants will also implement a set up internal control limits calculated considering the actual standard deviation of the calibration data in order to make better use of the statistical control tool (the Shewart charts) and take more timely decisions related to maintenance and calibration.	☒ The verifier agreed not to use the actual standard deviation to comply with the typical way of using Shewhart Chart, since EN14181 specify the way how to determine the control limit based on QAL1 data. The calculation has been submitted to the verifier with a positive comments from SGS the accredited laboratory to consider the results reasonable.
3.4. <u>Clarification Request #1.</u> Please submit copies of Zero/Span check records as well as Shewhart Charts for the 1 st and the 2 nd project campaigns at "Secunda", as some applicable Zero/Span check	The Shewhart Chart for the first and second project campaign at Secunda plant had been showed to the auditor during the onsite visit but it hadn't been split in two separate documents and then it had been difficult to differentiate each campaign. After the visit, the Shewhart Charts for the first	☒ Shewhart Chart maintained at both Sasolburg and Secunda plant have

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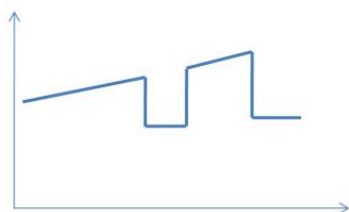
Corrective and Forward Action Requests by audit team	Summary of project owner response	Audit team conclusion
records were not found at the on-site visit, probably because of separated filing. Specially Shewhart Chart for the 1 st project campaign was not provided at the on-site visit.	and second project campaign were sent by email to the auditor. The Shewhart Chart corresponding to the second project campaign was corrected according to auditor's suggestions. Zero and span check records were sent to the auditor by email.	been submitted. The consistency has been verified in relation to CAR #1 mentioned above.
4.1. <u>Clarification Request #2.</u> Please submit evidences of the gauze composition and its' supplier used for the 2 nd and 3 rd project campaigns at Sasolburg plant.	A letter from the catalyst supplier was sent to the auditor as evidence of the composition and supplier used during second and third project campaigns at Sasolburg plant.	☒ The specification document issued by Heraeus S.A. (Pty) Ltd. has been submitted to prove the same catalyst, FTCplus used continuously from historic campaigns.
4.2. <u>Corrective Action Request #2.</u> Though Coriolis type mass flow meters for nitric acid are considered having long-life and "relatively maintenance-free", it is not permanently maintenance-free as long as the verifier talked to an agent of the manufacture in Japan. E.g. the stiffness of measurement tube could be changed because of corrosion or vibration. An agent also said, "Its' life depends on applications and users are to determine it." So, please establish practical calibration frequency which can be considered good industrial practice. Since more than 2 years have passed since installation, please investigate the	At Secunda plant, a Coriolis type mass flow meter Proline Promass 83 provided by Endress & Hauser is used to measure nitric acid production. The supplier states in the instruments' Manual that no special maintenance is required and that a zero adjustment is not necessary for this instrument at plant operating conditions, thus the credibility of the past measured data is considered appropriate. Nevertheless, following the Auditors' recommendation, Secunda has decided to replace the instrument with a second (identical) unit on a campaign basis; the removed instrument	☒ The letter from Endress & Hauser was submitted and what were stated in that letter has been considered reasonable as it was consistent to what the verifier heard from an other Coriolis meters supplier. And Sasol has

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Corrective and Forward Action Requests by audit team	Summary of project owner response	Audit team conclusion
credibility on the measured data in case such calibration frequency should be more frequent than every 3 years.	will be sent to the supplier's shop for maintenance and verification purposes; the verified unit will serve as replacement for the next changeover, and so on.	decided to implement periodic appearance check to comply with the recommendation of the manufacture.
4.2. <u>Corrective Action Request #3.</u> At Secunda plant, "test" frequency for the nitric acid mass flow meter is defined as "yearly" however there is no record found. I.e. Secunda plant does not comply with their internal procedures. This possibly is not limited to nitric acid mass flow meter. Then, please check consistency between "required" and "done" on "all" monitoring equipment listed. And, if inconsistent, please renew required calibration frequency based on manufactures' recommendation or Sasol's past experiences which can be considered as a good industrial practice. And please justify that the previous data recorded at Secunda plant still comply with such renewed calibration frequency since the start of the baseline campaign. If Secunda can not justify the compliance for the previous data, i.e. if the previous calibration frequency done is considered less than needed, please make conservative treatment on the previous data. And please submit all calibration records made at Secunda plant in 2007 and 2008.	A document containing records of the inspections made to the instruments was send to the auditor by email after the verification visit. That document also includes record of inspection made to the nitric acid mass flow meter. It should be noted that Nitric acid is an important intermediate of the complex output, so any significant inconsistency on reported production, would be identified by downstream inventory and sales (accounting) controls. Documents SECCDM0010- Critical CDM instrumentation and SECCDM0022- Calibration maintenance schedule for critical CDM project Activity Instrumentation, both included in the CDM Manual, were modified in order to reflect the current practices at the plant as explained on item 4.2 above.	☒ Procedures have been updated in accordance with the opinion of manufactures as mentioned in above CAR#2. No impact on the emission reductions calculation is considered consequently.

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Corrective and Forward Action Requests by audit team	Summary of project owner response	Audit team conclusion
4.2. <u>Clarification Request #3.</u> Please submit a certificate of Span gas used at Secunda plant in 2007. (Although I checked the current one, filled 04.08.2008 expired 14.08.09)	The certificate of the calibrated gases used during 2007 was submitted to the auditor by email.	☒ The certificates have been submitted.
5.1. <u>Clarification Request #4.</u> As long as the verifier draw the graph of N ₂ O concentration in tail gas during the 2 nd project campaign at Sasolburg plant, it has unusual shape at 2 points where N ₂ O concentration is apparently lower as below while tail gas flow is not low. As the supply of NH ₃ and Air to the reactor as well as the amount of nitric acid produced seem low too during these period, there can be simple reasons. And there possibly be no negative impact on conservativeness as the graph of hourly emission factor is rather lower during these periods. However, please clarify what happened including the reason why the tail gas flow can be still high during these period.	To understand the observed trend (N₂O low, stack flow not low), it is necessary to understand the plant design. The plant is equipped with a constant speed air compressor with no inlet guide vane control. This means that the compressor delivers a constant volume of air for a given suction atmospheric condition (humidity, ambient temperature and atmospheric pressure) and a required discharge pressure. When it is required to cut back production, the only way to affect lower production is to divert excess air directly to the expansion turbine inlet (to recover some of the compression energy not used). In doing so the excess air bypasses the conversion section and less acid is produced subsequently. Upstream of the expansion turbine the excess air joins the spent air from the ammonia burner and the absorption section (this is mainly nitrogen) to form the final tail gas which is then ejected back to atmosphere. The analyzer (N₂O, O₂, NO, NO₂) and stack flow measurement are located in the stack downstream of the expansion turbine; hence it meas-	☒ As a result of graphical analysis of ammonia supply and nitric acid produced, there is no significant increase or decrease of N ₂ O emissions considering simultaneous changes of ammonia supply and nitric acid production. I.e. the fluctuation has been considered to be the amount of bypassed air due to the change on the amount of ammonia supply, and the change on N ₂ O



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Corrective and Forward Action Requests by audit team	Summary of project owner response	Audit team conclusion
	ures a combination of excess and spent air. Normally the air (oxygen) is almost used to the full as indicated by the low oxygen content in the tail gas. When the plant runs at reduced production, the oxygen content of the tail gas will be higher compared to full production due to the presence of unused excess air. During the periods indicated the plant ran at reduced loads, as reflected by various indicators such as lower production, higher oxygen in the tail gas, lower ammonia consumption etc, due to: 27/12/2007 to 03/01/2008: Low demand for explosives due to festive season 19/03/2008 to 05/04/2008: Ammonia stock adjustments in preparation of statutory shutdown	concentration is considered real but no defective impact on the determination of N₂O emissions.
<u>Corrective Action Request #4.</u> Please recalculate baseline emissions as well as the amount of emission reductions in accordance with Annex 12 of EB12 report/	Recalculated and revised MR & spreadsheets have been submitted	☒ The revised values as well as the way of doing have been validated satisfactory.

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ANNEX 2: INFORMATION REFERENCE LIST

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Annex 2: Information Reference List

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Reference No.	Document or Type of Information
1	Final Project Design Document for CDM project “Sasol Nitrous Oxide Abatement Project”, South Africa dated January 15, 2008 as available at cdm.unfccc.int
2	Validation Report No. 2007-0195 Revision No. 01 for CDM project “Sasol Nitrous Oxide Abatement Project”, South Africa issued by Det Norske Veritas, dated February 7 , 2007 as available at cdm.unfccc.int
3	CDM Monitoring Report No. 0961, dated 25 th April 2008 of “Sasol Nitrous Oxide Abatement Project”, South Africa UNFCCC covering the period May 25 th , 2008 until October 1 st , 2008 (The final version at the 1 st verification))
4	CDM Monitoring Report No. 2, 0961, dated January 2009 of “Sasol Nitrous Oxide Abatement Project”, South Africa UNFCCC covering monitoring period from: October 2 nd 2007 to August 9 th 2008 (GSP version for this 2 nd verification)
5	“Secunda Baseline Emission Factor Recalculation for 2 nd project campaign.xls” submitted on 14 th January 2009 “Secunda Baseline Factor Recal 2nd project campaign.xls” dated 7 th December 2009 to comply with "eb51_repan12.pdf"
6	“Secunda First Project Campaign (02 Oct 07 to 05 Jan 08).xls” submitted on 14 th January 2009
7	“Secunda Second Project Campaign (12 Jan 08 to 09 Aug 08).xls” submitted on 14 th January 2009
8	“Sasolburg Baseline Emission Factor Calculation.xls” submitted on 15 th January 2009
9	“Sasolburg Baseline Emission Factor Recalculation for 2nd project campaign.xls” submitted on 15 th January 2009 “Sasolburg Baseline Recal 2nd project campaign.xls” dated 7 th December 2009 to comply with "eb51_repan12.pdf"
10	“Sasolburg second project campaign (03 Oct 07 - 05 Apr 08).xls” submitted on 15 th January 2009
11	“Sasolburg-Third project campaign (21 Apr 08 - 08 Dec 08).xls” submitted on 15 th January 2009
	On-site and on-line interviews conducted on February 9-12, 2009 by TÜV SÜD Verification team: Mr Yutaka Yoshida

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Reference No.	Document or Type of Information
	Mr TM Mthembu Laboratory Manager Sasol Nitro, Secunda South Africa Mr H. Marx Maintenance Sasol Nitro, Sasolburg South Africa Mr. JMJ. Pieters Instrument Control Sasol Nitro, Sasolburg South Africa Mr. CA. Cronje Production Sasol Nitro, Sasolburg, South Africa Mr. Fred van Heerden Instruments Sasol Nitro, Sasolburg, South Africa Mr. Siphwe Mthembu Production Sasol Nitro, Sasolburg, South Africa
12	Approved baseline and monitoring methodology AM0034, Version 2
13	AM0034, Version 03.3
14	The letter titled as “Re:Notes on 1973 design and test run data, Sasol HNO ₃ plant in Sasolburg, South Africa” dated 13 September 2006, providing the plant capacity data including old record as attachment made by Uhde, saying 522 ton 100% per day as the designed guaranteed minimum capacity and 556.8 ton 100% per day as demonstrated capacity in November 1973
15	For Secunda, the latest certificate with regard to atmospheric pollution, “Registration in terms of the Atmospheric Pollution Prevention ACT, 1965(ACT 45 of 1965)” dated on 04.Jan 1999 for the nitric acid processes is stating 860 t 100%HNO ₃ /d
16	Mail dated 14 th February 2008 from Infrachem SHERQ, Environmental Services giving testimony in relation to legislative compliance with NO _x regulation
17	SGS’s QAL2 Report, “Validation of N ₂ O Measurements Sasol Nitro Plant in Sasolburg”, February 2007 as period investigation
18	SGS’s QAL2 Report, “Validation of N ₂ O Measurements Sasol Nitro Plant in Secunda”, February 2007 as period investigation
19	SGS’s AST Report, done on 11 – 12 th August 2008
20	QAL3 Shewhart Chart being maintained with the results of periodic zero/span checks at Sasolburg,
21	QAL3 Shewhart Chart being maintained with the results of periodic zero/span checks at Secunda
22	CDM Operation Log, developed by Sasolburg to record any considerable events in relation to CDM monitoring activities, e.g. shutdown, breakdown, etc. examples from 21 April 2008 – 07 December 2008
23	Certificate label on the cylinder of nitrogen gas being used at Secunda for Zero check issued by AFROX, 99.998% as the purity, dated 24 July 2008
24	Certificate label on the cylinder of reference gas being used at Sasolburg for Span check issued by AIR LIQUIDE, analyzed at 2,547 ppmv in N ₂ gas, filled on 12-08-08 expires on 12-08-09
25	Certificate label on the cylinder of reference gas previously used at Sasolburg for Span check issued by AIR LIQUIDE, analyzed at 1,167 ppmv in N ₂ gas, filled on 24-03-06 expires on 24-03-07
26	Certificate label on the cylinder of reference gas being used at Secunda for Span check issued by AIR LIQUIDE, filled on 108-08

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Reference No.	Document or Type of Information
	expires on 08-09
27	Conversion Chart Weight/Concentration of HNO ₃ being used for the analysis at Sasolburg
28	Example of Monthly Production Report 12Jan08-10Feb09 at Secunda being used for cross checking of the amount of nitric acid produced.
29	Example of DailyProductionReport on 17 th – 19 th Jun. 08 at Secunda being used to check productivity and efficiency
30	Example of every 2 seconds data of N ₂ O concentration recorded on 11 th Feb. 2009 at Secunda.
31	Gauze Composition Specification and Report for 13 th Campaign (the 1 st project campaign) at Secunda issued on 26 th Feb. 2007 by Heraeus S.A. (Pty) Ltd.
32	Gauze Composition Specification and Report for 14 th Campaign (the 2 nd project campaign) at Secunda issued on 14 th Nov. 2007 by Heraeus S.A. (Pty) Ltd.
33	Gauze Composition Specification and Report for 15 th Campaign (the 3 rd project campaign) at Secunda issued on 7 th Jul.. 2007 by Heraeus S.A. (Pty) Ltd.
34	Gauze Composition Specification and Report for 12 th Campaign (baseline campaign) at Secunda issued on 19 th Jun. 2006 by Heraeus S.A. (Pty) Ltd.
35	Network Down Report at Secunda, took place on 18 th Jun. 08
36	Operation Permit of Nitric Acid plant at Sasolburg with regard to Atmospheric Air Pollution Prevention Act, 1965 issued by Department of Environmental Affairs and Tourism, issued on 28 th December 2004
37	Example of periodic check record for both Installation Condition and System Indication CDM monitoring equipment, made on 03-04-08
38	Example of hand writing operation log on 31/12/07 at Sasolburg including HNO ₃ concentration recorded every 2 hours
39	Product Data Sheet Rosemount3095 Mass Flow Meter for nitric acid produced
40	Example of Monthly Production Report 16 th Jan. 08 – 04 th Jan. 09 at Sasolburg being used for cross checking of the amount of nitric acid produced.
41	Screen shot indicating schematic diagram of the Sasolburg plant
42	Individual Zero/Span check records done by Secunda (July 2008-Oct2008)
43	Zero/Span check records done by an external laboratory, Rand Instruments (Pty) Ltd. provided to Secunda (26 April 2007 – 26 March 2008), as additional check to the above internal check.
44	Certificate label on the cylinder of reference gas previously used at Secunda for Span check issued by AIR LIQUIDE, analyzed at 1,885 ppmv N ₂ O in N ₂ gas, filled on 05-12-06 expires on 05-12-07

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Reference No.	Document or Type of Information
45	Gauze Composition Specification and Report for 18 th Campaign (for the campaign starting about 10th December 2008) at Sasolburg issued by Heraeus S.A. (Pty) Ltd. which indicates FTCplus continuously used from 9 th campaign at Sasolburg
46	“Critical instrumentation equipment – CDM Project Activities list”, SECCDM-0010 at Sasolburg
47	Calibration Certificate for Nitric Acid flowmeter, Micro Motion issued on 2008/04/11
48	Monthly check records on all CDM monitoring equipment at Sasolburg done in 2007
49	Monthly check records on all CDM monitoring equipment at Sasolburg done in 2008
50	Letter from Endress Hauser explaining about no special maintenance required for Coriolis type flowmeters (nitric acid) but recommending only appearance inspection every 3-6 months.
51	Algorithm of normalizing stack gas flow data with temperature and pressure data incorporated in DCS at Sasolburg
52	Product Data Sheet for the pressure transmitter installed on the stack gas flowmeter, explaining “real-time fully compensated with temperature and pressure data.”
53	sAMS calculation for Secunda to determine UCL/LCL of Shewhart chart
54	Uhde's Technical Document dated on 02.09.83
55	Fax from Uhde dated on 23 Jan 2008 to justify the range of OT _{normal} 860-920 written in PDD for Secunda, saying that higher than 890 improves efficiency but also increase platinum losses, and that lower than 860 reduces efficiency drastically.
56	International Fertilizer Society “Proceedings 50” ISBN 0 85310 1760, as the external literature indicating typical normal range in general for medium pressure type
57	Sasolburg-design capacity and pressure. pdf
58	letter from Heraeus dated on Oct and Nov 2006
59	Annex 12 of EB51 report clarifying the ways of recalculation of baseline emissions in relation to the campaign length http://cdm.unfccc.int/EB/051/eb51_repan12.pdf
60	Minutes of management review 29 July 2008 and 24 November 2008
61	Shut Down Maintenance/Calibration Records at Secunda for FI0116 Varify acid flow meter, done on 22/02/06, 16/08/06, 20/03/07, 18/01/08
62	Shut Down Maintenance/Calibration Records at Secunda for “Instr. Check“ temperature amd pressure on “BO101 LA MONT BOILER”, i.e. Ammonia Oxidization Reactor, done on 26/02/06, 26/08/06, 04/01/07, 18/01/2008
63	Shut Down Maintenance/Calibration Records at Secunda for FI0135 Varify flow meter readin (flow at stack), done on 22/02/06,

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Reference No.	Document or Type of Information
	10/03/07, 19/01/08
64	Re-Calibration record of ammonia and air flow meters at Sasolburg dated on 31/05/06, recorded on the sheet of “Dieterich Standard Flow Calculation”
65	Sasolburg “Instrument Calibration NAP Plant” dated on 12 June 2007 and 29 June 2007, as a list indicating individual calibration status including NH3 flow, air flow, mixed gas temperature (gauze temperature), NH3 pressure
66	Sasolburg, Mass ProBar Configuration Certification as a certificate for Air Flow Meter and NH3 Flow Meter, issued by NIC Instruments & Engineering, dated 01 April 2006
67	Historic hourly oxidization temperature at Sasolburg in the spreadsheet, used to determine permitted operating condition.
68	Sasolburg Hand writing logs of operating parameters, “NITRIC ACID LOGSHEET 1”, “1B”, “2B”, dated on 08/10/2006, 2003-01-17, 28/10/2001
69	QMS Documents prepared specifically for CDM activities including Overview Project Management, Responsibilities and document control procedures, List of measuring equipment and calibration frequencies, etc. for both Sasolburg and Secunda
70	CDM Monitoring Report No. 2, 0961, version 04, dated September 2009 of “Sasol Nitrous Oxide Abatement Project”, South Africa UNFCCC covering monitoring period from: October 2 nd 2007 to August 9 th 2008
71	CDM Monitoring Report No. 2, 0961, version 06, dated 17 th December 2009 of “Sasol Nitrous Oxide Abatement Project”, South Africa UNFCCC covering monitoring period from: October 2 nd 2007 to August 9 th 2008 (The final version for this 2 nd verification)
72	CDM Monitoring Report No. 2, 0961, version 07, dated 11 th March 2010 of “Sasol Nitrous Oxide Abatement Project”, South Africa UNFCCC covering monitoring period from: October 2 nd 2007 to August 9 th 2008 (The final version for this 2 nd verification)