VERIFICATION REPORT
ACHEMA, AB

VERIFICATION OF THE
ACHEMA UKL-7 PLANT N2O ABATEMENT PROJECT

MONITORING PERIOD:
10 AUGUST 2011 TO 28 AUGUST 2012

LINE 1: 23/08/2011 – 21/03/2011
LINE 2: 09/12/2011 – 17/07/2012
LINE 3: 26/08/2011 – 26/07/2012
LINE 4: 21/10/2011 – 28/08/2012
LINE 5: 28/11/2011 – 10/07/2012
LINE 6: 10/08/2011 – 23/04/2012
LINE 7: 02/09/2011 – 07/05/2012
LINE 8: 01/09/2011 – 05/04/2012

REPORT NO. LITHUANIA-VER/0061/2012
REVISION NO. 01

BUREAU VERITAS CERTIFICATION

Report No: LITHUANIA-VER/0061/2012

VERIFICATION REPORT

Date of first issue: 31/10/2012	Organizational unit: Bureau Veritas Certification Holding SAS
Client: ACHEMA AB	Client ref.: Andrejus Šostakas Head of Innovation Centre

Summary:
Bureau Veritas Certification has made the 5th periodic verification of the JI Track II Project "ACHEMA UKL-7 plant N2O abatement project", JI Registration Reference Number 0089, project of ACHEMA AB, located at Jonalaukis village, Rukla county, Jonava region municipality, Lithuania and applying the AM0034 "Catalyst reduction of N2O inside the ammonia burner of nitric acid plants" v02, methodology, on the basis of UNFCCC criteria for the JI, as well as the criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 6 of the Kyoto Protocol, the JI rules and modalities and the subsequent decisions by the JI Supervisory Committee, as well as the host country criteria.

The verification scope is defined as a periodic independent review and ex post determination by the Accredited Entity of the monitored reductions in GHG emissions during the defined verification period, and consisted of the following three phases: i) desk review of the project design and the baseline and monitoring plan; ii) follow-up interviews with project stakeholders; iii) resolution of outstanding issues and the issuance of the final verification report and opinion. The overall verification, from Contract Review to Verification Report & Opinion, was conducted using Bureau Veritas Certification internal procedures.

The first output of the verification process is a list of Clarification, Corrective Action Requests, Forward Action Requests (CR, CAR and FAR), presented in Appendix A.

In summary, Bureau Veritas Certification confirms that the project is implemented as planned and described in the approved project design documents. The installed equipment being essential for generating emission reduction runs reliably and is calibrated appropriately. The monitoring system is in place and the project is generating GHG emission reductions. The GHG emission reduction is calculated accurately and without material errors, omissions, or misstatements, and is total 1,056,081 tons of CO2eq for the monitoring period.

Our opinion relates to the project's GHG emissions and resulting GHG emission reductions reported and related to the approved project baseline and monitoring, and its associated documents.

Report No.: LITHUANIA-VER/0061/2012	Subject Group: JI	
Project title: ACHEMA UKL-7 plant N2O abatement project		
Work carried out by: Tomas Paulaitis: Lead Verifier		
Work reviewed by: Ashok Mammen		
Work approved by: Witold Dzugan		
Date of this revision: 21/11/2012	Rev. No.: 01	Number of pages: 24

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1 INTRODUCTION

ACHEMA, AB has commissioned Bureau Veritas Certification to verify the emission reductions of its JI project, the „ACHEMA UKL-7 plant N2O abatement project" (hereafter called "the project") located at Jonalaukis village, Rukla county, Jonava region municipality, Lithuania.

This report summarizes the findings of the verification of the project, performed on the basis of UNFCCC criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

1.1 Objective

Verification is a periodic independent review and ex post determination by the Accredited Independent Entity of the monitored reductions in GHG emissions during the defined verification period.

The objective of verification can be divided in Initial Verification and Periodic Verification.

UNFCCC criteria refer to Article 6 of the Kyoto Protocol, the JI rules and modalities and the subsequent decisions by the JI Supervisory Committee, as well as the host country criteria.

1.2 Scope

The verification scope encompasses an independent and objective review and ex-post determination of the monitored reductions in GHG emissions by the Accredited Independent Entity. The verification is based on the submitted monitoring report, the determined project design documents including its monitoring plan and determination report, previous verification reports, the applied monitoring methodology, relevant decisions, clarifications and guidance from the CMP and the JISC and any other information and references relevant to emission reductions resulting from the project activity. These documents are reviewed against the requirements of the Kyoto Protocol, the JI modalities and procedures and related rules and guidance and also against Lithuanian national JI guidelines.
The verification is not meant to provide any consulting towards the Client. However, stated requests for clarification, corrective and/or forward actions may provide input for improvement of the project monitoring towards reductions in GHG emissions.

1.3 Verification Team

The verification team consists of the following personnel:

Tomas Paulaitis

Bureau Veritas Certification Team Leader, Climate Change Verifier

Tomas Paulaitis is a lead auditor for the environment and quality management systems with over 10 years of experience and a lead GHG verifier (EU ETS, JI, CDM) with over 6 years of experience in energy, oil refinery and cement industry sectors, he was/is involved in the determination/verification of more than 50 JI projects. Tomas Paulaitis holds a Master's degree in chemical engineering.

This verification report was reviewed by:

Ashok Mammen
Bureau Veritas Certification, Internal Technical Reviewer
Bureau Veritas Certification Internal reviewer
Dr. Mammen is a lead auditor for environment, safety and quality management systems and a lead verifier and tutor for GHG projects. He has been involved in the validation and verification processes of more than 100 CDM/JI and other GHG projects.

2 METHODOLOGY

The overall verification, from Contract Review to Verification Report & Opinion, was conducted using Bureau Veritas Certification internal procedures.

In order to ensure transparency, the verification protocol was customized for the project, according to version 01 of the Joint Implementation Determination and Verification Manual, issued by the Joint Implementation Supervisory Committee at its 19 meeting on 04/12/2009. The protocol shows, in a transparent manner, the criteria (requirements), means of verification and the results from verifying the identified criteria. The verification protocol serves the following purposes:

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

The completed verification protocol is enclosed in Appendix A to this report.

2.1 Review of Documents

The Monitoring Report (MR) version 1 (dated 13/10/2012) (Ref /9/) submitted by ACHEMA, AB and additional background documents related to the project design and baseline, i.e. the country Law, Project Design Document (PDD), Approved CDM methodology and guidance on criteria for baseline setting and monitoring, Host party criteria, Kyoto Protocol, Clarifications on verification requirements to be checked by an accredited independent entity, were reviewed.

To address Bureau Veritas Certification corrective action and clarification requests, ACHEMA, AB revised the MR and resubmitted it as version 2 on 20/04/2012.
The verification findings presented in this report relate to the project as described in the PDD version 5 (dated 07/09/2009) (Ref/1/), and the Monitoring Report version 2 dated 21/11/2012 (Ref /10/).

2.2 Follow-up Interviews

On 22-23/10/2012 Bureau Veritas Certification performed on-site interviews with project stakeholders to confirm selected information and to resolve issues identified in the document review. Representatives of ACHEMA, AB were interviewed (see References). The main topics of the interviews are summarized in Table 1.

Table 1 Interview topics

Interviewed organization	Interview topics
ACHEMA, AB	Organizational structure, responsibilities and authorities Project implementation and technology Training of personnel Quality management procedures Metering equipment control Monitoring record keeping system Environmental requirements Monitoring plan Monitoring report

2.3 Resolution of Clarification, Corrective and Forward Action Requests

The objective of this phase of the verification is to raise the requests for corrective actions and clarification and any other outstanding issues that needed to be clarified for Bureau Veritas Certification positive conclusion on the GHG emission reduction calculation.

If the Verification Team assessing the monitoring report and supporting documents, identifies issues that need to be corrected, clarified or improved with regard to the monitoring requirements, it should raise these issues and inform the project participants of these issues in the form of:

(a) Corrective action request (CAR), requesting the project participants to correct a mistake that is not in accordance with the monitoring plan;

(b) Clarification request (CL), requesting the project participants to provide additional information for the Verification Team to assess compliance with the monitoring plan;

(c) Forward action request (FAR), informing the project participants of an issue, relating to the monitoring that needs to be reviewed during the next verification period.

The Verification Team will make an objective assessment whether the actions taken by the project participants, if any, satisfactorily resolve the issues raised, if any, and should conclude its findings of the verification.

To guarantee the transparency of the verification process, the concerns raised are documented in more detail in the verification protocol in Appendix A.

3 VERIFICATION CONCLUSIONS

In the following sections, the conclusions of the verification are stated.

The findings from the desk review of the original monitoring documents and the findings from interviews during the follow-up visit are described in the Verification Protocol in Appendix A.

The Clarification, Corrective and Forward Action Requests are stated, where applicable, in the following sections and are further documented in the Verification Protocol in Appendix A. The verification of the Project resulted in 1 Corrective Action Request, 1 Clarification Request, and 0 Forward Action Requests.

The number between brackets at the end of each section corresponds to the DVM paragraph.

3.1 Remaining issues and FARs from previous verifications

There was remaining FAR from the previous verification:
FAR1: Please provide final AST test report version for Lines 1,4,5,8,9 (date of test 11.12.2011 – 16.12.2011, date of preliminary report 30/03/2012). Requested final AST report version (Ref /14/) was provided and assessed (refer Appendix A section 101 (b) for more details), thus FAR1 is considered closed.

3.2 Project approval by Parties involved (90-91)

The written project approval (ref /3/) by the Netherlands was issued on 01/06/2010 by the DFP of that Party (NL Agency) when submitting the first verification report to the secretariat for publication in accordance with paragraph 38 of the JI guidelines, at the latest.

The above mentioned written approval is unconditional (the Project approval does not provide any specific additional conditions for the Project implementation and monitoring).

3.3 Project implementation (92-93)

The purpose of the project is the reduction of nitrous oxide (N2O) emissions from nitric acid production Lines at the nitric acid plant of AB Achema. The Company is situated in Jonava, Lithuania.
Achema operates two nitric acid production lines, one manufactured by Grande Paroisse, the other by UKL. This project relates to the UKL-7 line. The plant has a nameplate capacity of 2,800 tonnes of nitric acid per day of operation. UKL-7 plant consists of 8 separate production lines. Each line has its own ammonia and air preparation and feeding system, oxidation chamber, heat exchange system, turbine and absorption tower with individual production schedules (production shutdowns, primary

catalyst gauze changes, operating conditions). Tail gas ducts of individual production lines are connected to the common tail gas duct which takes the tail gas to 2 stacks, from which N2O is emitted to the atmosphere.
The installation of a secondary N2O reduction catalyst underneath the primary catalyst precious metal catching and catalytic gauzes package in the ammonium burner was applied in 8 production lines of Achema UKL-7 nitric acid plant in the period from April 2008 through December 2008. In the presence of this catalyst, N2O is broken down into harmless constituents of N2 and O2.
The secondary catalyst was placed in the appropriate support structure. The gap between the edge of the support structure and the inside wall of the ammonia burner was sealed to prevent the process gas by-passing the secondary catalyst. In this way the technology ensures that all gases which pass through the primary catalyst will also pass through the secondary catalyst.
AMS installed at the operating plant is in compliance with the European norm EN14181, which assumes three levels of quality assurance of the measurement systems - QAL1, QAL2 and QAL3.
The first level (QAL1) is assured and certified by the measurement equipment provider and it refers to the performance and accuracy of the system. The second level of quality assurance (QAL2) guarantees the correct installation of the AMS and its proper operation at the plant. The third level (QAL3) is aimed to guarantee the maintenance and regular proper functioning of the measurement equipment and the measurement data provided (see Annex A section 101 (b) for details on means of verification).
An N2O emission monitoring system is installed in 8 nitric acid lines of the plant, each with its own burner, absorption column and expansion turbine. Each production Line represents a separate nitric acid production unit, independent from each other.
The primary catalyst is changed at different times thus it is necessary to measure the emissions from each Line individually. This means that eight separate sets of monitoring equipment are installed to measure tail gas flow, nitric acid production, nitric acid concentration, and the operating conditions. N2O concentration in the tail gas is measured by 3 switched concentration meters. This monitoring plan change have been reviewed and validated during the 2nd verification already.

The project activity is completely operational and this has been confirmed during an on-site audit.

The project is implemented according to the description presented in the registered PDD. There are no project changes implemented after the previous verification.

3.4 Compliance of the monitoring plan with the monitoring methodology (94-98)

The monitoring occurred in accordance with the monitoring plan included in the PDD version 5 regarding which the determination has been deemed final and is so listed on the UNFCCC JI website: http://ji.unfccc.int/JI_Projects/DB/J2GCVCU6V2WU85ALR6GTD36P7QXIQQ/Determination/DNV-CUK1246515672.87/viewDeterminationReport.html, also taking into account monitoring plan revision dated 25/01/2011 which has been validated during the second verification already (see 2nd verification report, section 3.4 for more information).

Excel based calculation spreadsheets "THE N2O EMISSION REDUCTION CALCULATION MODEL (CALCULATION MODEL)" (Ref /11/,/12/) are developed to comply with the methodology AM0034 for "Catalytic reduction of N2O inside the ammonia burner of nitric acid plants" and the Monitoring plan. The tool's operating principles are clearly described in the ACHEMA N2O EMISSION REDUCTION PROJECT MODEL USER MANUAL (MODEL MANUAL)" (ref /15/).

MODEL MANUAL and CALCULATION MODEL were analyzed to ensure that the requirements of the AM0034 and Monitoring plan are fulfilled. All assumptions and references to the original data sources are clearly demonstrated, e.g. monitoring data, calibration parameters, nameplate capacity, the limit of extreme values. Emission factors are calculated using CALCULATION MODEL. Formulas and assumptions were verified and no discrepancies or mistakes found, except of CAR1. Default emission reduction factors are not used.

Revised Line 5 CALCULATION MODEL and Monitoring report version 2 were provided for audit as response to CAR1.
Revision was found correct, thus CAR1 has been resolved efficiently, refer Table 2 for more details.

3.5 Revision of monitoring plan (99-100)

Monitoring report was not revised during the 5th monitoring period.

3.6 Data management (101)

All data collection procedures are implemented in accordance with the monitoring plan and JI MANUAL
The Excel file of daily event register and N2O monitoring data (all raw data) are collected in EcoLogger system in an Excel file. After the end of the project campaign the Head Deputy of the Plant sends all campaign data to Vertis Environmental Finance, they paste the data to CALCULATION MODEL.
All CALCULATION MODELS are stored on the Vertis server in line with the storage requirements defined in the PDD for other project parameters.

The models are always, prior to sending to the verifier and publishing on the UNFCCC website, subjected to the internal quality control. This control consists of the control of the emission data as provided by Achema. These data are checked for their completeness and time accuracy. Further calculations are done by the project analyst and the results are audited by the supervising manager who has created the model and has excellent knowledge of its functionalities.

The Measurement equipment (including the Automatic measurement system and the Measurement system) is controlled and calibrated according to the requirements of JI MANUAL procedures (ref /18/-/26/).

3.7 Verification regarding programmes of activities (102-110)

Not applicable.

4 VERIFICATION OPINION

Bureau Veritas Certification has performed the 5th periodic verification of the JI Track II Project "ACHEMA UKL-7 plant N2O abatement project", located in Lithuania which applies the AM0034 "Catalyst reduction of N2O inside the ammonia burner of nitric acid plants" v02. The verification was performed on the basis of UNFCCC criteria and the host country criteria and also on the criteria given to provide for consistent project operations, monitoring and reporting.

The verification consisted of the following three phases: i) desk review of the project design and the baseline and monitoring plan; ii) follow-up interviews with project stakeholders; iii) resolution of outstanding issues and the issuance of the final verification report and opinion.

The management of ACHEMA, AB is responsible for the preparation of the data on GHG emission and the reported GHG emission reductions of the project on the basis set out within the project Monitoring and Verification Plan indicated in the final PDD version 5 issued on 07/09/2009. The development and maintenance of records and reporting procedures in accordance with that plan, including the calculation and determination of GHG emission reductions from the project, is the responsibility of the management of the project.

Bureau Veritas Certification verified the Project Monitoring Report version 2 dated 21 November 2012 for the reporting period as indicated below. Bureau Veritas Certification confirms that the project is implemented as planned and described in the approved project design documents. The installed equipment being essential for generating emission reduction runs reliably and is calibrated appropriately. The monitoring system is in place and the project is generating GHG emission reductions.

Bureau Veritas Certification can confirm that the GHG emission reduction is accurately calculated and is free of material errors, omissions or misstatements. Our opinion relates to the project's GHG emissions and resulting GHG emission reductions reported and related to the approved project baseline and monitoring, and its associated documents. Based on the information we have seen and evaluated, we confirm, with a reasonable level of assurance, the following statement:

Reporting period:	From 10/08/2011 to 28/08/2012	
Emission Reductions (year 2011):	393,123	t CO2 equivalents
Emission Reductions (year 2012):	662,958	t CO2 equivalents.
Emission Reductions (total):	1,056,081	t CO2 equivalents.

5 REFERENCES

Category 1 Documents:
Documents provided by ACHEMA, AB that relate directly to the GHG components of the project.

/1/ Project Design Document, version 5 dated 07/09/2009
/2/ Determination Report by Det Norske Veritas (DNV) No. 2008-086, version 02, dated 17/09/2009
/3/ The written project approval issued by the Netherlands DFP (NL Agency) on 01/06/2010
/4/ PPC permit, issued on 28/12/2004, revised on 05/01/2009
/5/ 1th Monitoring period Verification report No 0004/2010, issued by Bureau Veritas Certification on 03/06/2010
/6/ 2th Monitoring period Verification report No 15/2011, issued by Bureau Veritas Certification on 14/01/2011
/7/ 3th Monitoring period Verification report No 0031/2011, issued by Bureau Veritas Certification on 20/12/2011
/8/ 4th Monitoring period Verification report No 0048/2012, issued by Bureau Veritas Certification on 18/04/2011
/9/ 5th Monitoring Report version dated 16/10/2012 (initial version)
/10/ 5th Monitoring Report version 2 dated 21/11/2012 (final version)

/11/ CALCULATION MODEL's (initial versions provided for verification):
Achema UKL-1 EmissionReduction vB1_P3_23, dated 13/10/2012
Achema UKL-2 EmissionReduction vB1_P6_26, dated 13/10/2012
Achema UKL-3 EmissionReduction vB_Overlap_P5_26, dated 13/10/2012
Achema UKL-4 EmissionReduction vB2_P5_23, dated 13/10/2012
Achema UKL-5 EmissionReduction vB2_P5_23, dated 13/10/2012
Achema UKL-6 EmissionReduction vB2_P5_23, dated 17/03/2012
Achema UKL-7 EmissionReduction vB2_P5_26, dated 15/03/2012
Achema UKL-8 EmissionReduction vB2_P5_26, dated 13/10/2012

/12/ CALCULATION MODEL's (revised versions)
Achema UKL-1 EmissionReduction vB1_P3_24, dated 21/11/2012
Achema UKL-2 EmissionReduction vB1_P6_27, dated 21/11/2012
Achema UKL-3 EmissionReduction vB_Overlap_P5_27, dated 21/11/2012
Achema UKL-4 EmissionReduction vB2_P5_24, dated 21/11/2012
Achema UKL-5 EmissionReduction vB2_P5_26, dated 21/11/2012
Achema UKL-6 EmissionReduction vB2_P5_27, dated 21/11/2012
Achema UKL-7 EmissionReduction vB2_P5_27, dated 21/11/2012
Achema UKL-8 EmissionReduction vB2_P5_27, dated 21/11/2012

/13/ QAL 2 reports for the AMS issued by AIRTEC:
Nitric acid Line 1, date of test 09/12/2010-11/12/2010, issued on 21/03/2011
Nitric acid Line 2, date of test 31/08/2010-03/09/2010, issued on 20/12/2010
Nitric acid Line 4, date of test 09/12/2010-11/12/2010, issued on 21/03/2011
Nitric acid Line 5, date of test 09/12/2010-11/12/2010, issued on 21/03/2011
Nitric acid Line 3,6,7,8, date of test 25/02/2010-01/03/2010, issued on 20/08/2010

/14/ AST reports for the AMS issued by AIRTEC:
Nitric acid Lines 2,3,6,7, date of test 06/04/2011-08/04/2011, issued on 30/08/2011
Nitric acid Lines 1,4,5,8,9 date of test 11/12/2011-16/12/2011, issued on 30/03/2012
Nitric acid Lines 7,8, date of test 16-19/04/202

/15/ ACHEMA N2O EMISSION REDUCTION PROJECT MODEL USER MANUAL (MODEL MANUAL)
/16/ ISO 17025 certificate issued to AIRTEC by DAR, No :DAP-PL-4170.00, valid until 01/04/2012
/17/ ISO 17025 certificate issued to AIRTEC by DAkkS, No :D-PL-14615-01-00, issued on 03/03/2012
/18/ JI manual BI-122-2 UKL-7 plant, last revised on 03/05
/19/ UKL-7 measuring equipment QAL3 procedure, last revised on 15/01/
/20/ UKL-7 measuring equipment maintenance procedure, last revised on 15/01/2012
/21/ UKL-7 measuring equipment maintenance and calibration
/22/ UKL-7 measuring equipment maintenance and calibration logbooks
/23/ Measurement range control logbook
/24/ UKL-7 daily events logbook
/25/ CUSUM and Shewart's control records (Excel files)
/26/ Measurement range control logbook
/27/ Primary catalyst mounting and dismounting documents
/28/ Statement of the catalyst supplier (Johnson Matthey), dated 30/10/2012
/29/ Statement of the catalyst supplier (Hareous), dated 29/10/2012
/30/ Invoices for catalyst supplies (Umicore).

Category 2 Documents:
Background documents related to the design and/or methodologies employed in the design or other reference documents.

/1/ AM0034 "Catalyst reduction of N2O inside the ammonia burner of nitric acid plants" v02
/2/ EN 14181:2004 „Stationary source emissions - Quality assurance of automated measuring systems"

Persons interviewed:
List of persons interviewed during the verification or persons that contributed with other information that are not included in the documents listed above.

/1/ Andrius Kopustas, ACHEMA, Deputy chief of nitric acid plant
/2/ Stasys Pakštys, ACHEMA, Instrumentation department, Managing engineer
/3/ Aušra Januškevičiūtė ACHEMA, Innovation centre, Project manager

APPENDIX A: ACHEMA UKL-7 PLANT N2O ABATEMENT PROJECT VERIFICATION PROTOCOL

Check list for verification, according to the JOINT IMPLEMENTATION DETERMINATION AND VERIFICATION MANUAL (Version 01)

DVM Paragraph	Check Item	Initial finding	Draft Conclusion	Final Conclusion
Project approvals by Parties involved				
90	Has the DFPs of at least one Party involved, other than the host Party, issued a written project approval when submitting the first verification report to the secretariat for publication in accordance with paragraph 38 of the JI guidelines, at the latest?	A Project approval (Letter of Approval) from the Investor party was provided, issued by the Ministry of Economic Affairs, Netherlands, Agency NL Energy and Climate Change on 01/06/2010. This Letter of Approval was submitted to the secretariat during the first verification.	O.K.	O.K.
91	Are all the written project approvals by Parties involved unconditional?	Yes, all the written project approvals by Parties involved are unconditional.	O.K.	O.K.
Project implementation				
92	Has the project been implemented in accordance with the PDD regarding which the determination has been deemed final and is so listed on the UNFCCC JI website?	Installing a secondary N2O reduction catalyst underneath the primary catalyst precious metal catching and catalytic gauzes package in the ammonium burner as an N2O abatement technology was applied in UKL production lines of Achema plant in accordance with the PDD (version 5).	O.K.	O.K.
93	What is the status of operation of the project during the monitoring period?	The project was fully operational during the 5th monitoring period. The dates of the project campaign starting and end were verified accordingly to the records of UKL- 7 daily event log (Ref /24/, /27/) and catalyst mounting and dismounting documents: *Line 1* Project campaign 3 23/08/2011 - 21/032012 *Line 2* Project campaign 6 09/12/2011 – 17/07/2012	O.K.	O.K.

DVM Paragraph	Check Item	Initial finding	Draft Conclusion	Final Conclusion
		Line 3 Project campaign 5 26/08/2011 – 26/07/2012 *Line 4* Project campaign 5 21/10/2011 – 28/08/2012 *Line 5* Project campaign 5 28/11/2011 – 10/07/2012 *Line 6* Project campaign 5 10/08/2011 – 23/04/2012 Note: the end date of the previous project campaign is 10/08/2011. This was not treated as overlapping, because the last valid hourly data of the previous campaign do not overlap with the first hourly date of the campaign 5. *Line 7* Project campaign 5 02/09/2011 – 07/05/2012 *Line 8* Project campaign 5 01/09/2011 – 05/04/2012 Note: the end date of the previous project campaign is 01/09/2011. This was not treated as overlapping, because the last valid hourly data of the previous campaign do not overlap with the first hourly date of the campaign 5.		
Compliance with monitoring plan				

<table>
<tr><th>DVM Paragraph</th><th>Check Item</th><th>Initial finding</th><th>Draft Conclusion</th><th>Final Conclusion</th></tr>
<tr><td>94</td><td>Did the monitoring occur in accordance with the monitoring plan included in the PDD regarding which the determination has been deemed final and is so listed on the UNFCCC JI website?</td><td>The Excel based calculation tool “THE N2O EMISSION REDUCTION CALCULATION MODEL (CALCULATION MODEL) is developed to comply with the methodology AM0034 for “Catalytic reduction of N2O inside the ammonia burner of nitric acid plants” and the monitoring plan. The tool’s operating principles are clearly described in the ACHEMA N2O EMISSION REDUCTION PROJECT MODEL USER MANUAL (MODEL MANUAL)”.

MODEL MANUAL and CALCULATION MODEL were analyzed to ensure that the requirements of the AM0034 and the monitoring plan are fulfilled. The results of this analysis are described in the table below:

<table>
<tr><th>Requirement</th><th>Results</th></tr>
<tr><td colspan="2">Determination of the permitted operating conditions of the nitric acid plant to avoid overestimation of baseline emissions</td></tr>
<tr><td>- oxidation temperature and pressure (permitted range from PDD)</td><td>O.K.*</td></tr>
<tr><td>- ammonia gas flow rates and ammonia to air ratio input into the ammonia oxidation reactor (permitted range from PDD)</td><td>O.K.*</td></tr>
<tr><td colspan="2">Determination of baseline emission factor:</td></tr>
<tr><td>- the monitoring system is to be installed using the European Norm 14181 (2004)</td><td>O.K.*</td></tr>
<tr><td>- error readings (e.g. downtime or malfunction) and extreme values are to be automatically eliminated from the output data series by the monitoring system</td><td>O.K.*</td></tr>
<tr><td>$BE_{BC} = VSG_{BC} * NCSG_{BC} * 10^{-9} * OH_{BC}$</td><td>O.K.*</td></tr>
<tr><td>$EF_{BL} = (BE_{BC} / NAP_{BC}) (1 – UNC/100)$</td><td>O.K.*</td></tr>
</table>
</td><td>O.K.</td><td>O.K.</td></tr>
</table>

DVM Paragraph	Check Item	Initial finding		Draft Conclusion	Final Conclusion
		- any N_2O baseline data that are measured during the hours when the operating conditions are outside the permitted range must be eliminated from the calculation of the baseline emission factor.	O.K.*		
		- the baseline campaign operated inside the permitted range for more than 50% of the duration of the baseline campaign	O.K.*		
		- concluded with 95% confidence level, that average values of the permitted operating conditions are not different from average values obtained during the baseline determination period	O.K.*		
		-impact of regulations	O.K.		
		- the composition of the ammonia oxidation catalyst	O.K.*		
		- campaign length	O.K.*		
		- historic campaign length	O.K.*		
		- baseline campaign length (CLBL)	O.K.		
		Project Emissions:			
		- the monitoring system is to be installed using the guidance document EN 14181	O.K.		
		- error readings (e.g. downtime or malfunction) and extreme values are to be automatically eliminated from the output data series by the monitoring system.	O.K.		
		- project campaign length	O.K.		
		- the composition of the ammonia oxidation catalyst	CL1		
		PEn = VSG * NCSG * 10-9 * OH	O.K.		

DVM Paragraph	Check Item	Initial finding	Draft Conclusion	Final Conclusion
		- derivation of a moving average emission factor: O.K. - minimum project emission factor: N.A. * have been validated during the first verification.		
95 (a)	For calculating the emission reductions or enhancements of net removals, were key factors, e.g. those listed in 23 (b) (i)-(vii) above, influencing the baseline emissions or net removals and the activity level of the project and the emissions or removals as well as risks associated with the project taken into account, as appropriate?	See 94 above.	O.K.	O.K.
95 (b)	Are data sources used for calculating emission reductions or enhancements of net removals clearly identified, reliable and transparent?	The CALCULATION MODEL is designed in such a way, that all automatic links are implemented inside the spreadsheet and the model performs emission reduction calculations automatically. All assumptions and references to the original data sources are clearly demonstrated, e.g. monitoring data, calibration parameters, nameplate capacity, and the limit of extreme values.	O.K.	O.K.
95 (c)	Are emission factors, including default emission factors, if used for calculating the emission reductions or enhancements of net removals, selected by carefully balancing accuracy and reasonableness, and appropriately justified of the choice?	Emission factors are calculated using CALCULATION MODEL. Formulas and assumptions were verified and no discrepancies or mistakes found, except of CAR1. Default emission reduction factors are not used. CAR1: Line 5 MODEL: EF_{ma} (emission facto moving average) is 1,81 kg N2O/t HNO3, however value 1,99 N2O/t HNO3is used for final calculations (sheet 'SUMMARY', cell D8). Please correct this mistake.	CAR1	O.K.
95 (d)	Is the calculation of emission reductions or enhancements of net removals based on conservative assumptions and the most plausible scenarios in a transparent manner?	See 95 c) above.	O.K.	O.K.

DVM Paragraph	Check Item	Initial finding	Draft Conclusion	Final Conclusion
Applicable to JI SSC projects only				
96	Is the relevant threshold to be classified as JI SSC project not exceeded during the monitoring period on an annual average basis? If the threshold is exceeded, is the maximum emission reduction level estimated in the PDD for the JI SSC project or the bundle for the monitoring period determined?	Not applicable.	O.K.	O.K.
Applicable to bundled JI SSC projects only				
97 (a)	Has the composition of the bundle not changed from that is stated in F-JI-SSCBUNDLE?	Not applicable.	O.K.	O.K.
97 (b)	If the determination was conducted on the basis of an overall monitoring plan, have the project participants submitted a common monitoring report?	Not applicable.	O.K.	O.K.
98	If the monitoring is based on a monitoring plan that provides for overlapping monitoring periods, are the monitoring periods per component of the project clearly specified in the monitoring report? Do the monitoring periods not overlap with those for which verifications were already deemed final in the past?	Not applicable.	O.K.	O.K.
Revision of monitoring plan				
Applicable only if monitoring plan is revised by project participant				
99 (a)	Did the project participants provide an appropriate justification for the proposed revision?	Not applicable.	O.K.	O.K.
99 (b)	Does the proposed revision improve the accuracy and/or applicability of information collected compared to the original monitoring plan without changing conformity with the relevant rules and regulations for the establishment of monitoring plans?	Not applicable.	O.K.	O.K.
Data management				

DVM Paragraph	Check Item	Initial finding	Draft Conclusion	Final Conclusion
101 (a)	Is the implementation of data collection procedures in accordance with the monitoring plan, including the quality control and quality assurance procedures?	All data collection procedures are implemented in accordance with the monitoring plan. The Excel file of daily event register and N2O monitoring data (all raw data) are collected in EcoLogger system in an Excel file. After the end of the project campaign the Head Deputy of the Plant sends all campaign data to Vertis Environmental Finance, they paste the data to CALCULATION MODEL. All CALCULATION MODELS are stored on the Vertis server in line with the storage requirements defined in the PDD for other project parameters. The models are always, prior to sending to the verifier and publishing on the UNFCCC website, subjected to the internal quality control. This control consists of the control of the emission data as provided by Achema. These data are checked for their completeness and time accuracy. Further calculations are done by the project analyst and the results are audited by the supervising manager who has created the model and has excellent knowledge of its functionalities.	O.K.	O.K.
101 (b)	Is the function of the monitoring equipment, including its calibration status, in order?	The European Norm EN 14181 stipulates three levels of quality assurance tests (QAL) and one annual functional test for Automated Measuring Systems which are recommended to be used as guidance regarding the selection, installation and operation of the Automated Measuring Systems under this Monitoring Methodology: 1. (QAL1). Application of tested Automated Measuring System (evaluation according to DIN EN ISO 14956). Calculation of Automated Measuring System uncertainty before installation according to EN ISO 14956. QAL 1 certificate for the N2O concentration measurment is issued on 13 July 2007 by MCerts (accredited by UKAS). QAL 1 certificate for the tail gas flow meter is issued on 16/10/2008 by TUVRheinland (accredited by DAR) was revieved and validated during the first verification already. 2. (QAL 2). Installation and Calibration of the Automated	O.K.	O.K.

DVM Paragraph	Check Item	Initial finding	Draft Conclusion	Final Conclusion
		Measuring System according to the Standard Reference Measurement Method (SRM), determination of the measurement uncertainty/variability of the Automated Measuring System and inspection of the compliance with the prescribed measurement uncertainties. QAL2 tests were performed by AIRTEC for all lines: in September 2010 for line 2, in December 2010 for line 1,4 and 5, and in March 2010 for lines 3,6,7,8,9. AMS operation status was confirmed as normal without any malfunctions. The new calibration function has been established and used correctly since the date of QAL2 tests. Annual AST tests were carried out by ARTEC on 08/04/2011 for Lines 2,3,6,7 11/12/2011 – 16/12/2011 for Lines 1,4,5,8, 9 and 16-19/04/2012 for Lines 7,8. AMS operation status was confirmed as normal without any malfunctions. The measurement range for the calibration function validity was reviewed and confirmed. AIRTEC is ISO 17025 certified lab, certificate issued by DAR, No: DAP-PL-4170.00 and the latest certificate issued by DAkkS issued on 13/03/2012 were provided for verification. 3. (QAL 3). Continuous quality assurance through the local operator/manager (drift and accuracy of the Automated Measuring System, verification management and documentation). UKL-7 measuring equipment QAL3 procedure is implemented effectively, including checking according to Shewart's and CUSUM schemes. Other monitoring equipment is also controlled and calibrated according to these ACHEMA procedures: - UKL-7 measuring equipment maintenance procedure; - UKL-7 measuring equipment maintenance and calibration schedule. Calibration and maintenance was recorded in to the individual log		

DVM Paragraph	Check Item	Initial finding	Draft Conclusion	Final Conclusion
		books. Records was assessed and found in accordance with procedures and schedules above.		
101 (c)	Are the evidence and records used for the monitoring maintained in a traceable manner?	Raw data, entered to the CALCULATION MODEL was checked and compared with the data stored in the Data logger. It is validated that all data are used in traceable manner.	O.K.	O.K.
101 (d)	Is the data collection and management system for the project in accordance with the monitoring plan?	Yes, see 101 (a) above.	O.K.	O.K.
Verification regarding programs of activities (additional elements for assessment)				
102	Is any JPA that has not been added to the JI PoA not verified?	Not applicable.	O.K.	O.K.
103	Is the verification based on the monitoring reports of all JPAs to be verified?	Not applicable.	O.K.	O.K.
103	Does the verification ensure the accuracy and conservativeness of the emission reductions or enhancements of removals generated by each JPA?	Not applicable.	O.K.	O.K.
104	Does the monitoring period not overlap with previous monitoring periods?	Not applicable.	O.K.	O.K.
105	If the AIE learns of an erroneously included JPA, has the AIE informed the JISC of its findings in writing?	Not applicable.	O.K.	O.K.
Applicable to sample-based approach only				
106	Does the sampling plan prepared by the AIE: (a) Describe its sample selection, taking into account that: (i) For each verification that uses a sample-based approach, the sample selection shall be sufficiently representative of the JPAs in the JI PoA such extrapolation to all JPAs identified for that verification is reasonable, taking into account differences among the characteristics of JPAs, such as:	Not applicable.	O.K.	O.K.

DVM Paragraph	Check Item	Initial finding	Draft Conclusion	Final Conclusion
	− The types of JPAs; − The complexity of the applicable technologies and/or measures used; − The geographical location of each JPA; − The amounts of expected emission reductions of the JPAs being verified; − The number of JPAs for which emission reductions are being verified; − The length of monitoring periods of the JPAs being verified; and − The samples selected for prior verifications, if any?			
107	Is the sampling plan ready for publication through the secretariat along with the verification report and supporting documentation?	Not applicable.	O.K.	O.K.
108	Has the AIE made site inspections of at least the square root of the number of total JPAs, rounded to the upper whole number? If the AIE makes no site inspections or fewer site inspections than the square root of the number of total JPAs, rounded to the upper whole number, then does the AIE provide a reasonable explanation and justification?	Not applicable.	O.K.	O.K.
109	Is the sampling plan available for submission to the secretariat for the JISC.s ex ante assessment? (Optional)	Not applicable.	O.K.	O.K.
110	If the AIE learns of a fraudulently included JPA, a fraudulently monitored JPA or an inflated number of emission reductions claimed in a JI PoA, has the AIE informed the JISC of the fraud in writing?	Not applicable.	O.K.	O.K.

Table 2 Resolution of Corrective Action and Clarification Requests

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 1	Summary of project participant response	Verification team conclusion
CL1: Please provide primary catalyst composition into the MODELS sheet 'CampaignLength', cell J12:	94	Calculation MODEL's where amended with requested information.	Revised calculation models where reviewed. Provided information was crosschecked with invoices (in case of Lines 5,8, Ref /30/) and statements of the catalyst suppliers (in case of Lines 3,6,7 and lines 1,2,4, ref /28/ and /29/). There was confirmed that catalyst suppliers and composition were the same for baseline and project campaign, thus CL1 is closed.
CAR1: Line 5 MODEL: EF_{ma} (emission facto moving average) is 1,81 kg N2O/t HNO3, however value 1,99 N2O/t HNO3is used for final calculations (sheet 'SUMMARY', cell D8). Please correct this mistake.	95 (c)	Line 5 MODEL and Monitoring report version 2 is revised accordingly.	Mistake was corrected in the revised Line 5 MODEL (dated 21/11/2012) and Monitoring report version 2. This has resulted increase of the calculated emission reduction to 103,952 t CO2e compare with the previous version (100,053 t). CAR1 is closed.