



# VERIFICATION REPORT

## YARA AB

### VERIFICATION OF THE YARA KÖPING S3 N2O ABATEMENT PROJECT IN SWEDEN

#### MONITORING PERIOD:

09 MAY 2010 TO 06 MAY 2011

1<sup>st</sup> project campaign: 09/05/2010 – 02/11/2010

2<sup>nd</sup> project campaign: 03/11/2010 - 06/05/2011

BUREAU VERITAS CERTIFICATION

**REPORT No. SWEDEN-VER/0002/2011**

REVISION No. 02



VERIFICATION REPORT

Date of first issue: 27/01/2012	Organizational unit: Bureau Veritas Certification Holding SAS
Client: YARA AB	Client ref.: Mr. Axel Sylvén, YARA AB, Process Engineer

**Summary:**  
Bureau Veritas Certification has made the 1st periodic verification of the JI Track II Project “YARA KÖPING S3 N2O ABATEMENT PROJECT IN SWEDEN”, JI Registration Reference Number 0220, project of YARA AB, located at YARA Köping S3 plant, Köping, Sweden and applying the methodology AM0034 version 03.4 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 387404 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.: SWEDEN-VER/0002/2011	Subject Group: JI
Project title: YARA KÖPING S3 N2O ABATEMENT PROJECT IN SWEDEN	
Work carried out by: Tomas Paulaitis:                      Lead Verifier Tina Malmberg Frisch                Environmental specialist	
Work reviewed by: Ashok Mammen	
Work approved by: Witold Dzugan	
Date of this revision: 27/01/2012	Rev. No.: 02
Number of pages: 24	

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## 1 INTRODUCTION

YARA AB has commissioned Bureau Veritas Certification to verify the emission reductions of its JI project, the "YARA KÖPING S3 N2O ABATEMENT PROJECT IN SWEDEN", JI Registration Reference Number 0220, project of YARA AB, located at YARA Köping S3 plant, Köping, Sweden.

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.

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, 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, M.Sci. (chemical engineering)  
Bureau Veritas Certification Team Leader, Climate Change Verifier  
Tomas Paulaitis is a lead auditor for environment and quality management systems and a lead GHG verifier (EU ETS, JI) with 7 years of experience in GHG auditing and was/is involved in the determination/verification of more than 50 JI and CDM projects.

Tina Malmborg Frisch  
Bureau Veritas Certification Team Member, Environmental specialist  
Tina Malmborg Frisch is biologist and environmental auditor, long time experienced Environmental consultant and before that with experience from a number of different employments within the environmental area. She has been the lead consultant at a number of applications for environmental permits for ports and manufacturing industry as well as in the building up and audit of environmental management systems according to ISO 14001 and quality management system according to ISO 9001. Tina Malmborg Frisch is also very active in projects on long term sustainable development.

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 01, dated 28/09/2011 submitted by YARA 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, YARA AB revised the MR and resubmitted it on 27 January 2012 as version 02.

The verification findings presented in this report relate to the project as described in the PDD version 8 (dated 02/09/2011) and the Monitoring Report version 02 dated 27/01/2012.

### 2.2 Follow-up Interviews

On 19-20/09/2011 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 YARA AB were interviewed (see References). The main topics of the interviews are summarized in Table 1.

**Table 1 Interview topics**

Interviewed organization	Interview topics
YARA 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
N.serve Environmental Services GmbH	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 3 Corrective Action Requests and 3 Clarification 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

FAR1 and FAR2 from the previous verification cycle were remaining:

Forward Action Requests 01:

QAL1 certificate for analyser have to be available at 1st verification.

Requested QAL1 certificates were provided for verification and was found valid (see more details in Annex A section 95), hence FAR1 is closed.

Forward Action Requests 02:

Permitted ranges need to be defined using historical plant records. The analysis of the historical data in order to determine the permitted ranges for OTh, OPh, and upper limits for ammonia flow and ammonia to air ratio were not available during project determination.

Therefore, the values for OTnormal, OPnormal, AFRmax and AIFRmax will have to be verified by the verifying entity. Additionally CLnormal needs to be con-confirmed by verification entity with historical plant production logs.

Requested historical plant records were provided for verification including historical data from previous 4 historical campaigns, however data set was found not in accordance with ACM0034 requirements to use 5 previous historical campaigns and perform statistical tests to compare average values of the permitted operating conditions with the average values obtained during the baseline determination period using 95 percent confidentiality level. Therefore CAR1 and CAR2 were issued and then resolved (see more details in Annex A section 94). Since these CAR's are deemed resolved, FAR2 is closed also.





### 3.2 Project approval by Parties involved (90-91)

A written project approval (Letter of Approval) from the Investor party (The Netherlands) was provided, issued by NL Agency on 31/08/2011.

A written project approval (Letter of Approval) from the Host party (Sweden) was provided, issued by Swedish Energy Agency on 15/09/2011.

The above mentioned written approvals are unconditional, the Project approvals does not provide any specific additional conditions for the Project implementation and monitoring.

### 3.3 Project implementation (92-93)

Project is implemented at the existing facility of YARA's nitric acid plant Syra 3 (S3) in Köping, Sweden. It is a medium/high pressure plant with a daily design production output of 418 metric tonnes of HNO<sub>3</sub> (100% conc.) per day and is in operation since 1982.

The purpose of the project is the reduction of nitrous oxide (N<sub>2</sub>O) emissions from nitric acid production, in particular, the installation of the secondary N<sub>2</sub>O abatement catalyst system directly in the AOR's underneath the ammonia oxidation catalyst (Pt-Rh catalyst gauze) and equipment with AMS connected to tail gas stack for continuous monitoring N<sub>2</sub>O emission monitoring in accordance with EN 14181.

The project is implemented according to the description presented in the registered PDD including all key project components:

- N<sub>2</sub>O abatement catalyst installation gauze pack was installed above the primer catalyst on 09/05/2010;
- AMS, consisting of a Dr. Födisch MCA 04 Continuous Emissions Analyser, a sample probe, heated filter and heated sample-line connected directly to the analyzer, and a Dr. Födisch FMD 99 Stack Gas Flow meter. The AMS is connected to the plant's existing data collection system (Emerson DeltaV).

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

There are no project changes implemented after the project determination.

The project reached a higher emission reduction (387404 tCO<sub>2</sub> equivalents in 363 days to compare with the estimated 282 057 t CO<sub>2</sub> in the PDD). This is achieved because the emission factor was significantly lower (0,44308 kgN<sub>2</sub>O/tHNO<sub>3</sub> for 1st Project campaign and 0,64855 kgN<sub>2</sub>O/tHNO<sub>3</sub> for 2nd campaign) than estimated. ERUs are awarded for the achieved factual emission reductions and the estimated emission reduction level does not create any limitation of the ERUs issuance either in the PDD or in LoA's. However, in accordance with the methodology



AM0034, the maximum value of NAP eligible for ERUs issuance “shall not exceed the design capacity” (418 tHNO<sub>3</sub>/day or 151734 t/monitoring period). The factually produced NAP amount was found 134506 t and this was lower than the design capacity, hence all generated emission reductions are eligible for ERU’s issuance.

### **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 8 regarding which the determination has been deemed final and is so listed on the UNFCCC JI website: [http://ji.unfccc.int/JI\\_Projects/DB/YVZSL3U4OSPCGUHUO9FO82ENQTIH2B/Determination/TUEV-SUED1321360246.62/viewDeterminationReport.html](http://ji.unfccc.int/JI_Projects/DB/YVZSL3U4OSPCGUHUO9FO82ENQTIH2B/Determination/TUEV-SUED1321360246.62/viewDeterminationReport.html) and revised monitoring plan (see 3.5 below).

Excel based calculation spreadsheets are developed to comply with the validated project specific methodology based on AM0034 version 03.4 and the monitoring plan.

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. Formulas and assumptions were verified and no discrepancies or mistakes found. Default emission reduction factors are not used.

CAR 1-3 and CL1 which were related with compliance of the monitoring, have been resolved efficiently, see Annex 1 Table 2 for more details.

### **3.5 Revision of monitoring plan (99-100)**

Not applicable.

### **3.6 Data management (101)**

The nitric acid plant operator derives hourly averages for all of the monitored parameters from the Emerson DeltaV data collection system. This data is exported to Excel-format and delivered by email from the plant operator to N.serve, who is responsible for the correct analysis of the delivered data in accordance with the PDD.

At N.serve the received data is stored on the N.serve fileserver in a special section for the storage of monitoring data separately for each project. The files are protected against manipulation by a password. After the first plausibility-check, the data is transferred to a special database system. All necessary calculations and steps of data analysis of the monitoring data according to AM 0034 regulations, as well as other regulations outlined in this PDD, are carried out by N.serve using the database tool.

The results of the data analysis are transferred to the Excel spreadsheet. The results are used for the definition of the Project emissions as well as for the preparation of Monitoring reports.



All data collection procedures are implemented in accordance with the monitoring plan.

QAL1, QAL2, AST tests and QAL3 procedures are carried out by accredited laboratories in accordance with EN 14181 (see section 101 (b) for more details).

All the rest measurement devices of the Distributed control system (DCS) are checked and calibrated according to the internal procedure N° AGRI-26594 requirements since no legal requirements are set for calibration of those devices.

CL 2-3 which were related with data management, have been resolved efficiently, see Annex 1 Table 2 for more details.

### **3.7 Verification regarding programmes of activities (102-110)**

Not applicable.



#### 4 VERIFICATION OPINION

Bureau Veritas Certification has performed the 1st periodic verification of the JI Track II Project “YARA KÖPING S3 N2O ABATEMENT PROJECT IN SWEDEN”, which applies the methodology AM0034 version 03.4.

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 YARA 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 8 issued on 02/09/2011. 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 02 dated 27 January 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 09/05/2010 to 06/05/2011

Emission Reductions (year 2010):	257681	t CO2 equivalents
Emission Reductions (year 2011):	129723	t CO2 equivalents
Emission Reductions (total):	387404	t CO2 equivalents.



## 5 REFERENCES

### Category 1 Documents:

Documents provided by YARA AB that relate directly to the GHG components of the project.

- /1/ Project Design Document, version 8 dated 02/09/2009
- /2/ Determination Report issued by TÜV SÜD Industrie Service GmbH, No. 600500439, dated 27/10/2011
- /3/ 1st Monitoring Report version 01 dated 09/09/2011
- /4/ 1st Monitoring Report version 02 dated 27/01/2012
- /5/ Excel spreadsheet 20110620\_HistoricData-Baseline\_v4-WB, last modified 09/09/2011
- /6/ Excel spreadsheet 20110620\_HistoricData-Baseline\_v10, last modified 10/10/2011
- /7/ Excel spreadsheet 20110623\_ERcalc\_Syra3\_PC1\_v3-WB\_vs, last modified 12/09/2011
- /8/ Excel spreadsheet 20110623\_ERcalc\_Syra3\_PC2\_v3-WB\_vs, last modified 12/09/2011
- /9/ Excel spreadsheet 20110623\_ERcalc\_Syra3\_PC2\_v5, last modified 10/10/2011

### 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 N<sub>2</sub>O inside the ammonia burner of nitric acid plants", version 03.4
- /2/ AM0028 „Catalytic N<sub>2</sub>O destruction in the tail gas of Nitric Acid or Caprolactam Production Plants“, version 04.2
- /3/ EN 14181:2004 „Stationary source emissions - Quality assurance of automated measuring systems“
- /4/ Environmental Permit M 481-09 dated 17/06/2010
- /5/ QAL 1 certificate for FMD 99 issued on 13/05/2010 by TÜV Rheinland
- /6/ QAL 1 certificate for MCA04 issued on 02/08/2010 by TÜV Rheinland
- /7/ QAL 2 certificate issued on 14/06/2010 by MÜLLER BBM
- /8/ AST test report issued on 14/09/2011 by MÜLLER BBM
- /9/ Accreditation certificate No DAP-PL-3856.99 issued for TÜV Rheinland by DAP Deutsches Akkreditierungssystem Prüfwesen GmbH, valid until 31/01/2013
- /10/ Accreditation certificate No D-PL-14119-02-00 issued for MÜLLER BBM by Deutsche Akkreditierungsstelle GmbH (DAkkS), valid until 21/12/2014
- /11/ Quality management procedures N°AGRI-26665, N° AGRI -26594
- /12/ Monitoring system supervision procedures
- /13/ CUSUM charts
- /14/ Plant event and AMD downtime logbooks



**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/ Pär Hööh, YARA AB, Production manager
- /2/ Axel Sylvén, YARA AB, Process Engineer
- /3/ Lars-Håkan Karlsoon, Health, Environmental, Safety and Quality
- /4/ Wolfgang Brückner, N.serve Environmental Services GmbH, Project manager
- /5/ Volker Schmidt, N.serve Environmental Services GmbH, Project manager



## APPENDIX A: YARA KÖPING S3 N2O ABATEMENT PROJECT IN SWEDEN 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
<b>Project approvals by Parties involved</b>				
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 written project approval (Letter of Approval) from the Investor party (The Netherlands) was provided, issued by NL Agency on 31/08/2011. A written project approval (Letter of Approval) from the Host party (Sweden) was provided, issued by Swedish Energy Agency on 15/09/2011.	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.
<b>Project implementation</b>				
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?	The project is implemented according to the description presented in the registered PDD including all key project components: - N2O abatement catalyst installation gauze pack was installed above the primer catalyst on 09/05/2010; - AMS, consisting of a Dr. Födisch MCA 04 Continuous Emissions Analyser, a sample probe, heated filter and heated sample-line connected directly to the analyzer, and a Dr. Födisch FMD 99 Stack Gas Flow meter. The AMS is connected to the plant's existing data collection system (Emerson DeltaV).	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 1 <sup>st</sup> monitoring period. The project campaigns' starting and end dates were verified accordingly to the records of S3 plant event log.	O.K.	O.K.
<b>Compliance with monitoring plan</b>				



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DVM Paragraph	Check Item	Initial finding	Draft Conclusion	Final Conclusion																						
94	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?	<p>Excel based calculation spreadsheet <i>20110620_HistoricData-Baseline</i> is developed for baseline emission factor calculation, spreadsheets <i>20110623_ERcalc_Syra3_PCI</i> and <i>20110623_ERcalc_Syra3_PCI</i> are developed for the emission factor and emission reduction calculations of the project's 1<sup>st</sup> and 2<sup>nd</sup> campaigns respectively.</p> <p>Calculation spreadsheets were analyzed to ensure that the requirements of AM0034 and the Monitoring plan are fulfilled. The results of this analysis are described in the table below:</p> <table border="1"> <thead> <tr> <th>Requirement</th> <th>Results</th> </tr> </thead> <tbody> <tr> <td><i>Determination of the permitted operating conditions of the nitric acid plant to avoid overestimation of baseline emissions</i></td> <td></td> </tr> <tr> <td>- oxidation temperature and pressure</td> <td>CAR1</td> </tr> <tr> <td>- ammonia gas flow rates and ammonia to air ratio input into the ammonia oxidation reactor</td> <td>CAR1</td> </tr> <tr> <td><i>Determination of baseline emission factor:</i></td> <td></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><math>BE_{BC} = VSG_{BC} * NCSG_{BC} * 10^{-9} * OH_{BC}</math></td> <td>CAR3</td> </tr> <tr> <td><math>EF_{BL} = (BE_{BC} / NAP_{BC}) (1 - UNC/100)</math></td> <td>O.K.</td> </tr> <tr> <td>- any N2O 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.</td> <td>O.K.</td> </tr> <tr> <td>- the baseline campaign operated inside the permitted range for more than 50% of the duration of the baseline campaign</td> <td>CL1</td> </tr> </tbody> </table>	Requirement	Results	<i>Determination of the permitted operating conditions of the nitric acid plant to avoid overestimation of baseline emissions</i>		- oxidation temperature and pressure	CAR1	- ammonia gas flow rates and ammonia to air ratio input into the ammonia oxidation reactor	CAR1	<i>Determination of baseline emission factor:</i>		- the monitoring system is to be installed using the European Norm 14181 (2004)	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.	$BE_{BC} = VSG_{BC} * NCSG_{BC} * 10^{-9} * OH_{BC}$	CAR3	$EF_{BL} = (BE_{BC} / NAP_{BC}) (1 - UNC/100)$	O.K.	- any N2O 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	CL1	CAR1, CAR2, CAR3, CL1	O.K.
Requirement	Results																									
<i>Determination of the permitted operating conditions of the nitric acid plant to avoid overestimation of baseline emissions</i>																										
- oxidation temperature and pressure	CAR1																									
- ammonia gas flow rates and ammonia to air ratio input into the ammonia oxidation reactor	CAR1																									
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- the monitoring system is to be installed using the European Norm 14181 (2004)	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.																									
$BE_{BC} = VSG_{BC} * NCSG_{BC} * 10^{-9} * OH_{BC}$	CAR3																									
$EF_{BL} = (BE_{BC} / NAP_{BC}) (1 - UNC/100)$	O.K.																									
- any N2O 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	CL1																									





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DVM Paragraph	Check Item	Initial finding		Draft Conclusion	Final Conclusion
		- 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	CAR2		
		-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.		
		<i>Project Emissions:</i>			
		- 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.		
		$PE_n = VSG * NCSG * 10^{-9} * OH$	CAR3		
		- derivation of a moving average emission factor	O.K.		
		- minimum project emission factor	N.A.		
		<p>* As stated in the determination report there are no legal limits for N2O emission applicable for the Project. This was also confirmed during the verification site audit.</p> <p>As a result of the review, CAR1, CAR2, CAR3 and CL1 are issued:                      CAR1: Please, use the previous five (not four) campaigns to determine the permitted range for oxidation temperature, pressure, the upper limits for ammonia flow and ammonia to air ratio.                      CAR2: Please, perform a statistical test to compare average values of the permitted operating conditions with the average values</p>			



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DVM Paragraph	Check Item	Initial finding	Draft Conclusion	Final Conclusion
		obtained during the baseline determination period using 95 percent confidentiality level. CAR3: The lower limit $O_{Th}$ of 800 °C is considered as a trip limit in the monitoring report, however this limit is set as 830 °C actually. Please, correct the monitoring report accordingly. CL1: Please, demonstrate in the monitoring report that the plant operated inside the permitted range for more than 50 % of the duration of the baseline campaign.		
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?	Not applicable.	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 Excel spreadsheets are 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 and were thoroughly verified including event log records and raw data.	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 Excel spreadsheets. Formulas and assumptions were verified and no discrepancies or mistakes found.	O.K.	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?	Not applicable.	O.K.	O.K.
<b>Applicable to JI SSC projects only</b>				



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DVM Paragraph	Check Item	Initial finding	Draft Conclusion	Final Conclusion
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.
<b>Applicable to bundled JI SSC projects only</b>				
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.
<b>Revision of monitoring plan</b>				
<b>Applicable only if monitoring plan is revised by project participant</b>				
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.
<b>Data management</b>				
101 (a)	Is the implementation of data collection procedures	The nitric acid plant operator derives hourly averages for all of the	O.K.	O.K.



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DVM Paragraph	Check Item	Initial finding	Draft Conclusion	Final Conclusion
	in accordance with the monitoring plan, including the quality control and quality assurance procedures?	<p>monitored parameters from the Emerson DeltaV data collection system. This data is exported to Excel-format and delivered by email from the plant operator to N.serve, who is responsible for the correct analysis of the delivered data in accordance with the PDD. At N.serve the received data is stored on the N.serve fileserver in a special section for the storage of monitoring data separately for each project. The files are protected against manipulation by a password. After the first plausibility-check, the data is transferred to a special database system. All necessary calculations and steps of data analysis of the monitoring data according to AM 0034 regulations, as well as other regulations outlined in this PDD, are carried out by N.serve using the database tool.</p> <p>The results of the data analysis are transferred to the Excel spreadsheet. The results are used for the definition of the Project emissions as well as for the preparation of Monitoring reports.</p> <p>All data collection procedures are implemented in accordance with the monitoring plan.</p>		
101 (b)	Is the function of the monitoring equipment, including its calibration status, in order?	<p>Dr. Födisch MCA 04 gas analyser and Dr. Födisch FMD 99 stack gas flow meter are QAL1 tested; referenced testing and validation were provided for the review as well as QAL2 test report. All tests were carried out by accredited laboratories and are valid: the QAL1 test for N2O concentration measurement was performed by TÜV Rheinland (accredited by <i>DAP Deutsches Akkreditierungssystem Prüfwesen GmbH</i>, accreditation certificate No DAP-PL-3856.99) and published on 28/07/2010 in the German "Bundesanzeiger". The QAL2 audit was performed by Müller-BBM GmbH (accredited by <i>Deutsche Akkreditierungsstelle GmbH</i> (DAkkS), accreditation certificate No D-PL-14119-02-00) by following commissioning of the analyser on 14 June 2010.</p> <p>Linear regression coefficients in the Excel calculation are used in accordance with those defined in the QAL2 report.</p>	CL2	O.K.



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DVM Paragraph	Check Item	Initial finding	Draft Conclusion	Final Conclusion
		<p>The AST tests are planned annually, and they were carried out on 14/09/2011. It is stated in the report issued by Muller – BBM that no deficiencies were found and that AMS is in good condition. QAL3 procedures according to EN 14181 applied through documentation and evaluation on site are in accordance with the Plant internal procedure N°AGRI-26665. The implementation of this procedure was verified and found sufficiently documented and controlled, no discrepancies were found in CUSUM charts.</p> <p>All the rest measurement devices of the Distributed control system (DCS) are checked and calibrated according to the internal procedure N° AGRI-26594 requirements since no legal requirements are set for calibration of those devices.</p> <p>CL2: Table format in section D.2 is altered. Please, provide the information for all measured parameters in the Monitoring report section D.2: -Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity (if applicable); - Measuring/ Reading/ Recording frequency (if applicable); - Calculation method (if applicable); QA/QC procedures applied (if applicable).</p>		
101 (c)	Are the evidence and records used for the monitoring maintained in a traceable manner?	Raw data, entered to the Excel calculation spreadsheet were checked and compared with the data stored in the Emerson DeltaV data collection system. It is validated that all data are used in a 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. However, CL2 is issued: CL3: Please, explain in the Excel spreadsheet column “Events“ how the plant shutdown events have affected the raw data set during the project campaign.	CL3	O.K.
<b>Verification regarding programs of activities (additional elements for assessment)</b>				
102	Is any JPA that has not been added to the JI PoA not	Not applicable.	O.K.	O.K.



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DVM Paragraph	Check Item	Initial finding	Draft Conclusion	Final Conclusion
	verified?			
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.
<b>Applicable to sample-based approach only</b>				
106	<p>Does the sampling plan prepared by the AIE:</p> <p>(a) Describe its sample selection, taking into account that:</p> <p>(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:</p> <ul style="list-style-type: none"> <li>– The types of JPAs;</li> <li>– The complexity of the applicable technologies and/or measures used;</li> <li>– The geographical location of each JPA;</li> <li>– The amounts of expected emission reductions of the JPAs being verified;</li> <li>– The number of JPAs for which emission reductions are being verified;</li> <li>– The length of monitoring periods of the JPAs being verified; and</li> </ul>	Not applicable.	O.K.	O.K.



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DVM Paragraph	Check Item	Initial finding	Draft Conclusion	Final Conclusion
	– 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.



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**Table 2 Resolution of Corrective Action and Clarification Requests**

<b>Draft report clarifications and corrective action requests by validation team</b>	<b>Ref. to checklist question in table 1</b>	<b>Summary of project participant response</b>	<b>Verification team conclusion</b>
CAR1: Please, use the previous five (not four) campaigns to determine the permitted range for oxidation temperature, pressure, the upper limits for ammonia flow and ammonia to air ratio.	94	The previous five campaigns are used to determine permitted ranges, the Excel spreadsheet <i>20110620_HistoricData-Baseline</i> is revised accordingly.	The revised <i>20110620_HistoricData-Baseline_v10</i> is reviewed and found in accordance with ACM0034, hence CAR1 is closed. The revision has resulted in the EF <sub>BL</sub> change (from 9,8849 to 9,8367 kgN <sub>2</sub> O/tHNO <sub>3</sub> ).
CAR2: Please, perform a statistical test to compare average values of the permitted operating conditions with the average values obtained during the baseline determination period using 95 percent confidentiality level.	94	<i>20110620_HistoricData-Baseline</i> is amended with sheets OTh, OP, AFR, AIFR which contain statistical proofs that permitted ranges are comparable with average values obtained during the baseline determination.	The so-called “t-test” methodology was used in the revised <i>20110620_HistoricData-Baseline_v10</i> excel. The test results have proved statistical comparability, all calculated t <sub>0</sub> values are close to zero and are below standard t criteria, hence, CAR2 is closed.
CAR3: The lower limit O <sub>Th</sub> of 800 °C is considered as a trip limit in the monitoring report, however, this limit is set as 830 C actually. Please, correct the monitoring report accordingly.	94	The typing mistake is corrected in the revised Monitoring report version 02.	The revised Monitoring report was reviewed and the correction was validated, hence CAR3 is closed.





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<p>CL1: Please, demonstrate in the monitoring report that the plant operated inside the permitted range for more than 50 % of the duration of the baseline campaign.</p>	94	<p>The proof of having at least 50% of the baseline data within the permitted ranges is added to the baseline sheet.</p>	<p>The requested information is included in the revised <i>20110620_HistoricData-Baseline_v10</i> sheet “Calculations Baseline” lines 50-52 (99.81 % of the measured data are within the operating parameters defined in the historical campaigns). Hence, CL1 is closed.</p>
<p>CL2: The table format in section D.2 is altered. Please, provide the information for all measured parameters in the Monitoring report section D.2: -Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity (if applicable); - Measuring/ Reading/ Recording frequency (if applicable); - Calculation method (if applicable);</p> <p>QA/QC procedures applied (if applicable).</p>	101 (b)	<p>The requested additional information is provided in the revised Monitoring report version 02.</p>	<p>The revised monitoring report section D.2 was reviewed and found amended with sufficient information on monitoring equipment. Hence, CL1 is closed.</p>
<p>CL3: Please, explain in the Excel spreadsheet column “Events“ how the plant shutdown events have affected the raw data set (for baseline and project campaigns).</p>	101 (d)	<p>Column E „impact on data, 1 = excluded, 0 = none” is inserted to clarify how the raw data set was treated during the period of each particular event.</p>	<p>The amended column was reviewed and found in accordance with AMS downtime rules as described in the PDD, page 19. Hence, CL2 is closed.</p>