# JI VERIFICATION REPORT

## - 3.2RD PERIODIC –

## YARA MONTOIR NITRIC ACID PLANT

### YARA MONTOIR $N_2O$ ABATEMENT PROJECT

### ITL PROJECT ID : FR1000213

Monitoring Period: 2012-11-15 TO 2012-12-31 (incl. both days)

Monitoring/Verification sub-Period 3.2

**Report No: 8000414538.2 12/609**

**Date: 2013-03-01**

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|---|---|---|---|---|
| **Verification Report:** | ***Report No.*** | ***Rev. No.*** | ***Date of 1st issue:*** | ***Date of this rev.*** |
| | 8000414538.2-12/609 | 0 | 2013-03-01 | 2013-03-01 |
| **Project:** | ***Title:*** | | ***Registration date:*** | ***UNFCCC-No.:*** |
| | "Yara Montoir $N_2O$ Abatement Project" | | 2010-09-12 | FR1000213 |
| **Project Participant(s):** | ***Host party:*** | | ***Other involved parties:*** | |
| | France | | Belgium | |
| **Applied methodology/ies:** | ***Title:*** | | ***No.:*** | ***Scope:*** |
| | Project specific methodology: *'Catalytic reduction of N2O at nitric acid plants'* | | N/A | 5 |
| **Monitoring:** | ***Monitoring period (MP):*** | | ***No. of days:*** | ***MP No.*** |
| | 2012-11-15 to 2012-12-31- both days included | | 47 | 3.2 |
| **Monitoring report:** | ***Title:*** | | ***Draft version:*** | ***Final version:*** |
| | "Yara Montoir $N_2O$ Abatement Project" | | v1 dated 2013-01-11 | v2 dated 2013-02-05 |
| **Verification team / Technical Review and Final Approval** | ***Verification Team:*** | | ***Technical review:*** | ***Final approval:*** |
| | Rainer Winter (TL) Sabine Meyer Dirk Speyer | | Susanne Pasch Ulrich Walter | Eric Krupp |
| **Emission reductions: [t $CO_2e$]** | ***Verified amount*** | | ***As per Draft MR:*** | ***As per PDD*** |
| | 14,063 | | 14,063 | *12,280 (Redet-PDD Ver. 12)* |

**Summary of Verification Opinion:**

Yara Montoir Nitric Acid Plant has commissioned the TÜV NORD JI/CDM Certification Program to carry out the 3rd periodic verification (sub period 3.1 and 3.2) of the project: "Yara Montoir $N_2O$ Abatement Project", with regard to the relevant requirements for JI (Track 1) project activities. The project reduces GHG emissions due to reduction of $N_2O$ emissions. This verification covers the sub period (3.2) from 2012-11-15 to 2012-12-31 (including both days).

In the course of the verification 2 Corrective Action Requests (CAR) and 0 Clarification Request (CL) were raised and successfully closed. The verification is based on the draft monitoring report, revised monitoring report, and the monitoring plan as set out in the registered PDD, the determination report, emission reduction calculation spreadsheet and supporting documents made available to the TÜV NORD JI/CDM CP by the project participant.

As a result of this verification, the verifier confirms that:

- all operations of the project are implemented and installed as planned and described in the project design document.
- the monitoring plan is in accordance with the applied country specific methodology: Méthode pour les Projets Domestiques: "Réduction catalytique du N2O dans des usines d'acide nitrique".
- the installed equipment essential for measuring parameters required for calculating emission reductions are calibrated appropriately.
- the monitoring system is in place and functional. The project has generated GHG emission reductions.

As the result of the verification of sub period 3.2, the verifier confirms that the GHG emission reductions are calculated without material misstatements in a conservative and appropriate manner. TÜV NORD JI/CDM CP herewith confirms that the project has achieved emission reductions in the above mentioned reporting period as follows:

Emission reductions: **14,063** t $CO_2e$

Including a deduction of 10% according to the Arrêté du 2 mars 2007.

| | | |
|---|---|---|
| **Document information:** | *Filename:* | *No. of pages:* |
| | 2013-03-01_FVR Yara Montoir Ver 3.2.docx | 73 |

## Abbreviations:

| | |
|---|---|
| **AIE** | **Accredited Independent Entity** |
| **AMS** | **Automated Measuring System** |
| **CA** | **Corrective Action / Clarification Action** |
| **CAR** | **Corrective Action Request** |
| **CDM** | **Clean Development Mechanism** |
| **CL** | **Clarification Request** |
| **$CO_2$** | **Carbon dioxide** |
| **$CO_2e$** | **Carbon dioxide equivalent** |
| **DVM** | **Determination and Verification Manual** |
| **ER** | **Emission Reduction** |
| **ERU** | **Emission Reduction Units** |
| **FAR** | **Forward Action Request** |
| **GHG** | **Greenhouse gas(es)** |
| **$HnO_3$** | **Nitric Acid** |
| **JI** | **Joint Implementation** |
| **MP** | **Monitoring Plan** |
| **MR** | **Monitoring Report** |
| **$N_2O$** | **Nitrous Oxide** |
| **PCS** | **Process Control System** |
| **PDD** | **Project Design Document** |
| **PP** | **Project Participant** |
| **QA/QC** | **Quality Assurance / Quality Control** |
| **UNFCCC** | **United Nations Framework Convention on Climate Change** |
| **XLS** | **Emission Reduction Calculation Spread Sheet** |

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# 1. INTRODUCTION

YARA Montoir NITRIC ACID PLANT (Yara France) has commissioned the TÜV NORD JI/CDM Certification Program (CP) to carry out the 3rd periodic verification of the project

*"YARA MONTOIR $N_2O$ ABATEMENT PROJECT"*

with regard to the relevant requirements for JI (Track 1) project activities. The verifiers have reviewed the implementation of the monitoring plan (MP) in the registered JI project number FR1000213[1].

GHG data for the monitoring period covering the sub period 3.2 from 2012-11-15 to 2012-12-31 was verified in detailed manner applying the set of requirements, audit practices and principles as required under the Determination and Verification Manual /DVM/ of the UNFCCC.

This report is related to the verification sub-period 3.2, which forms the second part of verification period 3 (01/02/2012 to 31/12/2012). Due to time constraints regarding the issuance of ERUs in 2013 the on-site visit was conducted before the end of the whole verification period. The outstanding data for verification sub-period 3.2 was provided by PP for this verification after the end of MP.
This report summarizes the findings and conclusions of this periodic verification of sub period 3.2 of the above mentioned UNFCCC registered project activity.

## *1.1. Objective*

The objective of the verification is the review and ex-post determination by an independent entity of the GHG emission reductions. It includes the verification of the:

- implementation and operation of the project activity as given in the PDD,
- compliance with applied approved monitoring plan,
- data given in the monitoring report by checking the monitoring records, the emissions reduction calculation and supporting evidence,
- accuracy of the monitoring equipment,
- quality of evidence,
- significance of reporting risks and risks of material misstatements.

## *1.2. Scope*

The verification of this registered project is based on the project design document /PDD/, the monitoring reports /MR/, emission reduction calculation spreadsheet /XLS/, supporting documents made available to the verifier and information collected

[1] http://ji.unfccc.int/JIITLProject/DB/TI8WEH10KLOWWD6VKENE03RDY64DVV/details

through performing interviews and during the on-site assessment. Furthermore publicly available information was considered as far as available and required.

The verification is carried out on the basis of the following requirements, applicable for this project activity:

- Article 6 of the Kyoto Protocol /KP/,
- guidelines for the implementation of Article 6 of the Kyoto Protocol as presented in the Marrakech Accords under decision 9/CMP.1 /MA/, and subsequent decisions made by the JISC and COP/MOP,
- other relevant rules, including the host country legislation,
- JI Validation and Verification Manual /DVM/,
- monitoring plan as given in the registered PDD /PDD/,
- Projet Domestique Methodology: "Catalytic reduction of $N_2O$ at nitric acid plants " Méthode pour les Projets Domestiques: "Réduction catalytique du $N_2O$ dans des usines d'acide nitrique"

# 2. GHG PROJECT DESCRIPTION

## 2.1. Project Characteristics

Essential data of the project is presented in the following Table 2-1.

**Table 2-1:** Project Characteristics

| Item | Data | | |
|---|---|---|---|
| Project title | Yara Montoir $N_2O$ Abatement Project | | |
| JI Track | ☒ Track 1 | ☐ Track 2 | ☐ JPA |
| Project size | ☒ Large Scale | ☐ Small Scale | |
| JI Approach | ☒ JI Specific Approach | ☐ Approved CDM Methodology | |
| Project Scope *(according to UNFCCC sectoral scope numbers for CDM)* | ☐ | 1 | Energy Industries (renewable- /non-renewable sources) |
| | ☐ | 2 | Energy distribution |
| | ☐ | 3 | Energy demand |
| | ☐ | 4 | Manufacturing industries |
| | ☒ | 5 | Chemical industry |
| | ☐ | 6 | Construction |
| | ☐ | 7 | Transport |
| | ☐ | 8 | Mining/Mineral production |
| | ☐ | 9 | Metal production |
| | ☐ | 10 | Fugitive emissions from fuels (solid, oil and gas) |
| | ☐ | 11 | Fugitive emissions from production and consumption of halocarbons and hexafluoride |
| | ☐ | 12 | Solvents use |
| | ☐ | 13 | Waste handling and disposal |
| | ☐ | 14 | Land-use, land-use change and forestry |
| | ☐ | 15 | Agriculture |
| Methodology: | *Project Domestique Methodology: "Catalytic reduction of $N_2O$ at nitric acid plants"* | | |
| Technical Area(s): | 5.1: $N_2O$ (chemical process industries) | | |
| ITL Project ID No.: | FR1000213 | | |
| Crediting period | ☐ Renewable Crediting Period (7 y)<br>☒ Fixed Crediting Period (2.3 y)[*)] | | |

[*)] Until the end of the 1st Kyoto Commitment period on 31/12/2012, in accordance with the host country LoA.

## 2.2. Project Verification History

Essential events since the registration of the project are presented in the following Table 2-2.

**Table 2-2:** Project verification history

| # | Item | Time | Status |
|---|---|---|---|
| 1 | Date of registration | 2010-09-12[2)] | - |
| 2 | Start of crediting period | 2010-09-12 | - |
| 3 | 1st Monitoring period | 2010-09-12 to 2010-12-31 | Closed, ERUs were issued |
| 4 | 2nd Monitoring period | 2011-01-01 to 2012-01-31 | Closed, ERUs were issued |
| 5 | Re-determination considering the specific | | |

| # | Item | Time | Status |
|---|---|---|---|
| | project emissions of the 1st, 2nd as well as 4 months of the 3rd verification period for the estimation of ERUs | 2012-10-18 | Closed |
| 6 | Revision of LoA with a new cap for emission reductions to be issued for this project is now 185,437 after deduction | 2012-11-13 | Issued |
| 7 | Monitoring period 3: sub period 3.1 | 2012-02-01 to 2012-11-14 | Closed |
| 8 | Monitoring period 3: sub period 3.2 | 2012-11-15 to 2012-12-31 | Subject of this verification report |

2) Date of registration is the date two month after submission of the full project documentation and request for LoA to the MEEDDM

## 2.3. Involved Parties and Project Participants

The following parties to the Kyoto Protocol and project participants are involved in this project activity (Table 2-3).

**Table 2-3:** Project Parties and project participants

| Characteristic | Party | Project Participant |
|---|---|---|
| Host party | France | YARA France SAS<br>YARA International ASA<br>N.serve Environmental Services GmbH |
| Other Involved Party | Belgium | YARA France SAS |

## 2.4. Project Location

The details of the project location are given in table 2-4:

**Table 2-4:** Project Location

| No. | Project Location |
|---|---|
| Host Country: | France |
| Region: | Region North West,<br>Department: Loire-Atlantique;<br>Commune: Montoir-de-Bretagne |
| Project location: | Plant absorption tower and tail gas stack:<br>47°18'3 0.85"N, 2° 7'4.50"W<br>Ammonia burner:<br>47°18'30.67"N, 2° 7'9.02"W |

## 2.5. Technical Project Description

The project activity aims to reduce levels of $N_2O$ emissions from the production of nitric acid with a secondary $N_2O$ abatement technology: the project involves the installation of a secondary $N_2O$ reduction catalyst at the nitric acid production plant. The emission reductions are a result of the catalytic decomposition of nitrous oxide. Nitrous oxide which is formed as by-product of the nitric acid production will be removed by the catalyst installed below the standard precious metal gauze pack in the ammonia burner. The nitrous oxide would otherwise be emitted as part of the tail gas of the nitric acid plant to the atmosphere.

The key parameters for the project are given in table 2-5:

**Table 2-5:** Technical data of the plant

| Parameter | Unit | Value |
|---|---|---|
| 2 Ammonia Oxidation Reactors | | |
| Plant type | | 3 bar medium pressure plant |
| Manufacturer | - | Uhde/Grande Paroisse |
| Start of commercial production | - | February 1972 |
| Operating conditions as per specifications (trip point values) | | |
| - Temperature (min/max): | ℃ | 725 - 925 |
| - Pressure (max): | Bar | 3.5 |
| - Ammonia to Air ratio (max) | % | 12.5 |
| Ammonia Oxidation Catalyst | | |
| Manufacturer | - | K. A Rasmussen AS |
| Type | - | n.a. |
| Composition: | - | Pt-Rh-Pd |
| Absorber | | |
| Design capacity per day (100 %) | $tHNO_3/d$ | 1,030 |
| Design capacity per day (legal) | $tHNO_3/d$ | 1,030 |
| Annual production (design) | days/year | 340 |
| Annual production (practice) | days/year | 340 |
| Secondary Catalyst | | |
| Start of operation | - | May 2009 |
| Manufacturer | - | YARA |
| Type | - | 58-Y1 |
| Composition: | - | cobalt (ii, iii) oxide<br>dialuminium cobalt tetraoxide<br>Cu, Fe, Mn, Ni, Ce |
| Design efficiency $N_2O$ reduction<br>• guaranteed by supplier<br>• Measured during MR | <br>%<br>% | <br>88<br>92 |
| $N_2O$ Analyzer (stack) | | |
| Manufacturer | - | Dr. Födisch Umweltmesstechnik GmbH |
| Type | - | MCA 04 |
| Measurement Principle | - | IR absorption |
| Stack volume flow rate | | |

| Parameter | Unit | Value |
|---|---|---|
| measurement | | |
| Manufacturer | - | Dr. Födisch Umweltmesstechnik GmbH |
| Type | - | FMD 99 |
| Measurement Principle | - | Differential pressure |

# 3. METHODOLOGY AND VERIFICATION SEQUENCE

## 3.1. Verification Steps

The verification consisted of the following steps:

- Contract review
- Appointment of team members and technical reviewers
- Publication of the monitoring report
- A desk review of the Monitoring Report /MR/ submitted by the client and additional supporting documents with the use of customised verification protocol /CPM/ according to the Determination and Verification Manual /DVM/,
- Verification planning,
- On-Site assessment,
- Background investigation and follow-up interviews with personnel of the project developer and its contractors,
- Draft verification reporting
- Resolution of corrective actions (if any)
- Final verification reporting
- Technical review
- Final approval of the verification.

The sequence of the verification is given in the table 3.1 below:

**Table 3.1:** Verification sequence

| Topic | Time |
|---|---|
| Assignment of verification | 2012-10-31 |
| On-site-visit | 2012-11-15 |
| Draft reporting finalised | 2012-11-15 |
| Final reporting finalised | 2013-03-01 |
| Technical review finalised | 2013-03-01 |

## 3.2. Contract review

To assure that

- the project falls within the scopes for which accreditation is held,

- the necessary competences to carry out the verification can be provided,
- Impartiality issues are clear and in line with the CDM accreditation requirements

a contract review was carried out before the contract was signed.

## *3.3. Appointment of team members and technical reviewers*

On the basis of a competence analysis and individual availabilities a verification team, consistent of one team leader and 2 additional team members, was appointed. Furthermore also the personnel for the technical review and the final approval were determined.

The list of involved personnel, the tasks assigned and the qualification status are summarized in the table 3-1 below.

**Table 3-1:** Involved Personnel

| | Name | Company | Function [1] | Qualification Status [2] | Scheme competence [3] | Technical competence [4] | Verification competence [5] | Host country Competence | On-site visit |
|---|---|---|---|---|---|---|---|---|---|
| ☒ Mr. ☐ Ms. | Winter, Rainer | TN CERT GmbH | TL[A] | SA | ☒ | 5.1 | ☒ | ☐ | ☐ |
| ☒ Mr. ☐ Ms. | Speyer, Dirk | TN CERT GmbH | TM[A] | LA | ☒ | 5.1 | ☒ | ☐ | ☒ |
| ☐ Mr. ☒ Ms. | Meyer, Sabine | TN CERT GmbH | TM[A] | LA | ☒ | | ☒ | ☒ | ☐ |
| ☐ Mr. ☒ Ms. | Pasch, Susanne | TN CERT GmbH | TR[B] | LA | ☒ | | ☒ | ☐ | - |
| ☒ Mr. ☐ Ms. | Walter, Ulrich | TN CERT GmbH | TR[B] | LA | ☒ | 5.1 | ☒ | ☐ | - |
| ☒ Mr. ☐ Ms. | Eric Krupp | TN CERT GmbH | FA[B] | SA | ☒ | | ☒ | ☐ | - |

[1] TL: Team Leader; TM: Team Member, TR: Technical review; OT: Observer-Team, OR: Observer-TR; FA: Final approval

[2] GHG Auditor Status: A: Assessor; LA: Lead Assessor; SA: Senior Assessor; T: Trainee; TE: Technical Expert

3) GHG auditor status (at least Assessor)
4) As per S01-MU03 or S01-VA070-A2 (such as 1.1, 1.2, …)
5) In case of verification projects

A) Team Member: GHG auditor (at least Assessor status), Technical Expert (incl. Host Country Expert or Verification Expert), not ETE
B) No team member

## 3.4. Publication of the Monitoring Report

In accordance with decision 9/CMP.1 (§ 36) the draft monitoring report, as received from the project participants, has been made publicly available on the TÜV NORD Website http://www.global-warming.de. Comments received are taken into account in the course of the verification, if applicable. No comments were received.

## 3.5. Verification Planning

In order to ensure a complete, transparent and timely execution of the verification task the team leader has planned the complete sequence of events necessary to arrive at a substantiated final verification opinion.

Various tools have been established in order to ensure an effective verification planning.

Risk analysis and detailed audit testing planning

For the identification of potential reporting risks and the necessary detailed audit testing procedures for residual risk areas table A-1 is used. The structure and content of this table is given in table 3-2 below.

**Table 3-2:** Table A-1; Identification of verification risk areas

| ***Table A-1: GHG calculation procedures and management control testing / Detailed audit testing of residual risk areas and random testing*** | | | | |
|---|---|---|---|---|
| **Identification of potential reporting risk** | **Identification, assessment and testing of management controls** | **Areas of residual risks** | **Additional verification testing performed** | **Conclusions and Areas Requiring Improvement (including *Forward Action Requests*)** |

| ***Table A-1: GHG calculation procedures and management control testing / Detailed audit testing of residual risk areas and random testing*** | | | | |
|---|---|---|---|---|
| **Identification of potential reporting risk** | **Identification, assessment and testing of management controls** | **Areas of residual risks** | **Additional verification testing performed** | **Conclusions and Areas Requiring Improvement (including *Forward Action Requests*)** |
| *The following potential risks were identified and divided and structured according to the possible areas of occurrence.* | *The potential risks of raw data generation have been identified in the course of the monitoring system implementation.*<br>*The following measures were taken in order to minimize the corresponding risks.*<br>*The following measures are implemented:* | *Despite the measures implemented in order to reduce the occurrence probability the following residual risks remain and have to be addressed in the course of every verification.* | *The additional verification testing performed is described. Testing may include:*<br>- *Sample cross checking of manual transfers of data*<br>- *Recalculation*<br>- *Spreadsheet 'walk throughs' to check links and equations*<br>- *Inspection of calibration and maintenance records for key equipment*<br>- *Check sampling analysis results*<br>*Discussions with process engineers who have detailed knowledge of process uncertainty/error bands.* | *Having investigated the residual risks, the conclusions should be noted here. Errors and uncertainties are highlighted.* |

The completed table A-1 is enclosed in the annex 1 (table A-1) to this report.

Project specific periodic verification checklist

In order to ensure transparency and consideration of all relevant assessment criteria, a project specific verification protocol has been developed. The protocol shows, in a transparent manner, criteria and requirements, means and results of the verification. The verification protocol serves the following purposes:

- It organises, details and clarifies the requirements a JI project is expected to meet for verification
- It ensures a transparent verification process where the verifying AIE documents how a particular requirement has been proved and the result of the verification.

The basic structure of this project specific verification protocol for the periodic verification is described in table 3-3.

**Table 3-3:** Structure of the project specific periodic verification checklist

| ***Table A-2: Periodic verification checklist*** | | | | | | |
|---|---|---|---|---|---|---|
| ***No.*** | ***DVM[2] paragraph / Checklist Item*** *(incl. guidance for the determination team)* | ***Initial Finding*** *(Means and results of assessment)* | ***Ref.*** | ***Action requested to project participant*** *(CAR, CL, FAR)* | ***Review of PP´s action*** | ***Conclusion*** |
| *Number of the checklist item* | *The section gives a reference to the relevant paragraph of the DVM. The checklist items are linked to the various requirements the project should meet. The checklist is organised in various sections. Each section is then further subdivided as per the requirements of the topic and the individual project activity.* | *The section is used to elaborate and discuss the checklist item in detail. It includes the initial assessment of the verification team and how the assessment was carried out.* | *Gives reference to the information source on which the assessment is based on.* | *Assessment based on evidence provided if the criterion is not fulfilled a CAR, CL or FAR (details of each finding are elaborated in chapter 4) is raised otherwise no action is requested. The assessment refers to the draft verification stage.* | *Assessment based on the project participant action in response to the raised CAR, CL or FAR (details of each finding are elaborated in chapter 4). The assessment refers to the final verification stage.* | *Final assessment at the final verification stage is given.* |

The periodic verification checklist (verification protocol) is the backbone of the complete verification starting from the desk review until final assessment. Detailed assessments and findings are discussed within this checklist and not necessarily repeated in the main text of this report.

The completed verification protocol is enclosed in the annex (table A-2) to this report.

## 3.6. Desk review

During the desk review all documents initially provided by the client and publicly available documents relevant for the verification were reviewed. The main documents are listed below:

[2] JISC 19 Annex 4

- the last revision of the PDD including the monitoring plan/PDD/,
- the last revision of the determination report/DET/,
- the monitoring report, including the claimed emission reductions for the project/MR/,
- the emission reduction calculation spreadsheet/XLS/.

Other supporting documents, such as publicly available information on the UNFCCC / host country website and background information were also reviewed.

## *3.7. On-site assessment*

As most essential part of the verification exercise it is indispensable to carry out an inspection on site in order to verify that the project is implemented in accordance with the applicable criteria. Furthermore the on-site assessment is necessary to check the monitoring data with respect to accuracy to ensure the calculation of emission reductions. The main tasks covered during the site visit include, but are not limited to:

- The on-site assessment included an investigation of whether all relevant equipment is installed and works as anticipated.
- The operating staff was interviewed and observed in order to check the risks of inappropriate operation and data collection procedures.
- Information processes for generating, aggregating and reporting the selected monitored parameters were reviewed.
- The duly calibration of all metering equipment was checked.
- The monitoring processes, routines and documentations were audited to check their proper application.
- The monitoring data were checked completely.
- The data aggregation trails were checked via spot sample down to the level of the meter recordings.

Before and during the on-site visit the verification team performed interviews with the project participants to confirm selected information and to resolve issues identified in the document review.

Representatives of Nitric Acid Plant and project developer (consultant) including the operational staff of the plant were interviewed. The main topics of the interviews are summarised in Table 3-4.

**Table 3-4:** Interviewed persons and interview topics

| Interviewed Persons / Entities | Interview topics |
|---|---|
| 1. Projects & Operations Personnel, Yara Montoir Nitric Acid Plant | - General aspects of the project<br>- Technical equipment and operation<br>- Changes since validation<br>- Calibration procedures<br>- Quality management system |

| Interviewed Persons / Entities | Interview topics |
|---|---|
| | - Involved personnel and responsibilities<br>- Training and practice of the operational personnel<br>- Implementation of the monitoring plan<br>- Monitoring and measurement equipment<br>- Maintenance |
| 2. Consultant, N.serve | - Remaining issues from validation<br>- Monitoring data management<br>- Data uncertainty and residual risks<br>- GHG emission reduction calculation<br>- Procedural aspects of the verification<br>- Environmental aspect |

## *3.8. Draft verification reporting*

On the basis of the desk review, the on-site visit, follow-up interviews and further background investigation the verification protocol is completed. This protocol in conjunction with the general project and procedural description of the verification and a detailed list of the verification findings forms the draft verification report. This report is sent to the client for resolution of raised CARs, CLs and FARs.

## *3.9. Resolution of CARs, CLs and FARs*

Non-conformities raised during the verification can either be seen as a non-fulfilment of criteria ensuring the proper implementation of a project or where a risk to deliver high quality emission reductions is identified.

Corrective Action Requests (CARs) are issued, if:

- Non-conformities with the monitoring plan or methodology are found in monitoring and reporting, or if the evidence provided to prove conformity is insufficient;
- Mistakes have been made in applying assumptions, data or calculations of emission reductions which will impair the estimate of emission reductions;
- Issues identified in a FAR during validation or previous verifications requiring actions by the project participants to be verified during verification have not been resolved.

The verification team uses the term Clarification Request (CL), which is be issued if:

- information is insufficient or not clear enough to determine whether the applicable JI requirements have been met.

Forward Action Requests (FAR) indicate essential risks for further periodic verifications. Forward Action Requests are issued, if:

- the monitoring and reporting require attention and / or adjustment for the next verification period.

For a detailed list of all CARs, CLs and FARs raised in the course of the verification pl. refer to chapter 4.

## *3.10. Final reporting*

Upon successful closure of all raised CARs and CLs the final verification report including a positive verification opinion can be issued. In case not all essential issues could finally be resolved, a final report including a negative verification opinion is issued.

The final report summarizes the final assessments w.r.t. all applicable criteria.

## *3.11. Technical review*

Before submission of the final verification report a technical review of the whole verification procedure is carried out. The technical reviewer is a competent GHG auditor being appointed for the scope this project falls under. The technical reviewer is not considered to be part of the verification team and thus not involved in the decision making process up to the technical review.

As a result of the technical review process the verification opinion and the topic specific assessments as prepared by the verification team leader may be confirmed or revised. Furthermore reporting improvements might be achieved.

## *3.12. Final approval*

After successful technical review an overall (esp. procedural) assessment of the complete verification will be carried out by a senior assessor located in the accredited premises of TÜV NORD.

After this step the request for issuance can be started.

# 4. VERIFICATION FINDINGS

In the following paragraphs the findings from the desk review of the monitoring report/MR/, the calculation spreadsheet/XLS/, PDD/PDD/ and other supporting documents, as well as from the on-site assessment and the interviews are summarised.

The summary of CAR, CL and FAR issued are shown in Table 4-1:

**Table 4-1:** Summary of CAR, CL and FAR

| Verification topic | No. of CAR | No. of CL | No. of FAR |
|---|---|---|---|
| A – Project Approvals | 2 | 0 | 0 |
| B – Project Implementation | 0 | 0 | 0 |
| C – Monitoring Plan Compliance | 0 | 0 | 0 |
| D – Monitoring Plan Revision | 0 | 0 | 0 |
| E – Data Management | 0 | 0 | 0 |
| **SUM** | **2** | **0** | **0** |

The following tables include all raised CARs, CLs and FARs and the assessments of the same by the verification team. For an in depth evaluation of all verification items it should be referred to the verification protocols (see Annex).

| **Finding:** | **CAR A1** | | |
|---|---|---|---|
| **Classification** | ☒ CAR | ☐ CL | ☐ FAR |
| **Description of finding** *Describe the finding in unambiguous style; address the context (e.g. section)* | Based on related FAR raised during previous verification: The number of ERUs from former verifications and the ERUs of the actual period shall not exceed the cap defined in the new French LoA of 185,437 tonnes of $CO_2e$ (after 10% deduction). | | |
| **Corrective Action #1** *This section shall be filled by the PP. It shall address the corrective action taken in details.* | *The French DFP limited the maximum emission reductions allowed for the Yara Montoir project to* 185,437 *ERUs (after deduction). The total sum of ERUs achieved by this project activity is below this cap.* | | |

| Finding: | CAR A1 |
|---|---|
| **AIE Assessment #1**<br>*The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and AIE assessments (#2, #3, etc.) shall be added.* | The verification team has checked the total amount of emission reduction generated by this project activity and compared it with the cap set by the French DFP. It can be confirmed that the total amount is below the cap |
| **Conclusion**<br>*Tick the appropriate checkbox* | ☐ To be checked during the next periodic verification<br>☒ Appropriate action was taken<br>☐ Project documentation was corrected correspondingly<br>☐ Additional action should be taken<br>☒ The project complies with the requirements |

| Finding: | CAR A2 | | |
|---|---|---|---|
| **Classification** | ☒ CAR | ☐ CL | ☐ FAR |
| **Description of finding**<br>*Describe the finding in unambiguous style; address the context (e.g. section)* | The following points in the MR shall be further clarified or corrected:<br>a) Section 4, flow chart: The $HNO_3$ flow meter is not traceable (the little box pointing at it is located outside the chart).<br>b) Section 6.4, wording QAL 2: "The most recent QAL2 test was conducted (...) on 28/09/2009".<br>c) Annex 2: The date of the first QAL2 test for NCSG is not consistent with the dates for the same test for VSG/TSG etc. (28-**30**.09-2009) and the second QAL2 test is not stated for PSG.<br>d) The comparison of ERUs (MR with PDD) is not done with the newest version of the (re-determined) PDD. Furthermore the related days in the comparison are not correct. | | |
| **Corrective Action #1**<br>*This section shall be filled by the PP. It shall address the corrective action taken in details.* | *a) The indicators on the flow chart in section 4 have now been correctly positioned*<br>*b) The wording of section 6.4 (QAL2) has now been changed*<br>*c) The dates for the first QAL2 test in Annex 2 are now consistent. The most recent QAL2 test has been added for PSG.*<br>*d) The re-determined PDD has now been used for the comparison of ERUs. The number of days of the verification period has been corrected.* | | |

| Finding: | CAR A2 |
|---|---|
| **AIE Assessment #1**<br>*The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and AIE assessments (#2, #3, etc.) shall be added.* | a) OK.<br>The little box is now directly located to the position of the flow meter in the pipe installation of the plant.<br>b) OK.<br>The QAL2 test conducted by Müller-BBM on 28/09/2009 (Report No. M82 450/2 and M82 450/4) is now correctly mentioned as the first one.<br>c) OK.<br>The date of carrying out the QAL 2 test No. M82 450/2 by Müller-BBM is now stated as 28-30/09/2009 which is correct.<br>The QAL2-test carried out by Müller-BBM, report No. M101194/01 on the PSG-device has been included correctly<br>d) OK.<br>The verification team confirms that it was predicted that 95,367 ERUs would be earned in 2012. This equates to 12,280 ERUs for the 47-day verification sub-period (95,367 / 365 days * 47 days). |
| **Conclusion**<br>*Tick the appropriate checkbox* | ☐ To be checked during the next periodic verification<br>☒ Appropriate action was taken<br>☐ Project documentation was corrected correspondingly<br>☐ Additional action should be taken<br>☒ The project complies with the requirements |

# 5. SUMMARY OF VERIFICATION ASSESSMENTS

The following paragraphs include the summary of the final verification assessments after all CARs and CRs are closed out. For details of the assessments pl. refer to the discussion of the verification findings in chapter 4 and the verification protocol (Annex 1).

## *5.1. Implementation of the project*

During the verification a site visit was carried out. On the basis of this site visit and the reviewed project documentation it can be confirmed that w.r.t. the realized technology, the project equipments, as well as the monitoring and metering equipment, the project has been implemented and operated as described in the registered PDD.

## *5.2. Project history*

There is one open FAR raised during the verification of sub period 3.1, related to the maximum value (cap) of ERUs of the whole monitoring period stated in the valid host country LoA (pls see CAR A1 for further assessment). It can be concluded that the new cap for emission reductions to be issued for this project is now 185,437 tonnes of $CO_2e$ (after 10% deduction)/PDD-RD/. Total claimed ERUs for the project activity are less.

## *5.3. Special events*

No other special events with effect on the monitoring of the project have been observed during the monitoring period, except the reported situations in Appendix of MR regarding shutdowns of the nitric acid plant and the downtime of the automated measuring system:

| Date | Event |
|---|---|
| complete sub period | PSG transmitted incorrectly to DCS. Correct value on electronic of FMD99. PSG value replaced by 1013 hPa. PSG is not used in the ER since the flow meter is |
| 17.12.2012 11:00 until 17.12.2012 15:00 | Analyzer stopped to replace the heated sampling pipe. |

Table 5.3.: Special events

## 5.4. Compliance with the monitoring plan

The monitoring system and all applied procedures are in compliance to the registered monitoring plan; the monitoring plan is in accordance with the applied country specific methodology: Méthode pour les Projets Domestiques: "Réduction catalytique du $N_2O$ dans des usines d'acide nitrique".

## 5.5. Monitoring parameters

During the verification all relevant monitoring parameters (as listed in the PDD) have been verified with regard to the appropriateness of the applied measurement / determination method, the correctness of the values applied for ER calculation, the accuracy, and applied QA/QC measures. The results as well as the verification procedure are described parameter-wise in the project specific verification checklist.

It can be confirmed that all monitoring parameters have been measured / determined without material misstatements and in line with all applicable standards and relevant requirements.

| Parameter: | Unit/Value: | |
|---|---|---|
| $NCSG_n$ | [mg $N_2O/Nm^3$] | |
| | 28.10 | average |
| | 20.77 | lower limit of confidence interval |
| | 35.68 | upper limit of confidence interval |
| | | |
| $VSG_n$ | [$Nm^3/h$] | |
| | 137,624 | mean |
| | 115,593 | lower limit of confidence interval |
| | 154,469 | upper limit of confidence interval |

Table 5.5.1: Upper/Lower limits and mean value of NCSG and VSG according to statistical analysis applied for ER-calculation

| Parameter: | Unit: | Applied value: |
|---|---|---|
| $OH_n$ | [h] | 1,128 |
| $NAP_n$ | [$tHNO_3$] | 45,642.29 |

| | | |
|---|---|---|
| OT | [°C] | Not applicable |
| AIFR | [%] | Not applicable |
| TSG | [°C] | Not applicable |
| PSG | [Pa] | Not applicable |
| $EF_{reg}$ | [$kgN_2O/tHNO_3$] | 1.20 kg $N_2O/tHNO_3$ for the whole monitoring period. |
| $EF_n$ | [$kgN_2O/tHNO_3$] | 0.09559<br>According to formula: $EF_n = (PE_n / NAP_n)$ |
| $PE_n$ | [$kgN_2O$] | 4,362.74 |

Table 5.5.2: Monitored plant parameter/results of ER calculation

## 5.6. Monitoring report

A draft monitoring report was submitted to the verification team by the project participants. The verification team has made this report publicly available prior to the start of the verification activities. No comments were received.

During the verification, needs for clarifications were identified. The PP has carried out the requested corrections so that it can be confirmed that the monitoring report is complete and transparent and in accordance with the registered PDD and other relevant requirements.

## 5.7. ER Calculation

The calculation of the emission reduction is based on hourly averages data or parameters retrieved from the data processing unit.

A statistical evaluation of raw data (hourly averages) was applied for calculating campaign specific emissions:

- For all $N_2O$ data sets a plausibility check was conducted. All data sets containing values that are implausible were eliminated.
- Calculation of the sample mean (x);
- Calculation of the sample standard deviation(s);
- Calculation of the 95% confidence interval (equal to 1.96 times the standard deviation);
- Elimination of all data that lie outside the 95% confidence interval;
- Calculation of the new sample mean from the remaining values.

| Parameter | Value | Unit |
|---|---|---|
| NAP Nitric Acid Production (100% concentrate) | 45,642.29 | $tHNO_3$ |

| Parameter | Value | Unit |
|---|---|---|
| EF Emission Factor | 0.09559 | $kgN_2O/tHNO_3$ |
| Governmental ERU deduction | 10 | % |
| Emission Reductions (this 3rd.2 period) | 14,063 | $tCO_2e$ |
| Emission Reductions (3rd.1 period) | 58,513 | $tCO_2e$ |
| Emission Reductions (2nd period) | 62,249 | $tCO_2e$ |
| Emission Reduction (1st period) | 21,653 | $tCO_2e$ |
| Sum of emission reduction generated | 156,478 | tCO2e |
| LoA-cap/LOA/ (with deduction) | 185,437 | $tCO_2e$ |
| Max. emission reduction below cap | Yes | |

Table 5.7: Data for ER-calculation

## *5.8. Quality Management*

Quality Management procedures for measurements, collection and compilation of data, data storage and archiving, calibration, maintenance and training of personnel in the framework of this JI project activity have been defined. The procedures defined can be assessed as appropriate for the purpose.

| Parameter | Measurement device | QA/QS-Measures | |
|---|---|---|---|
| | | Last | Next |
| $N_2O$-mass flow | • Dr. Födisch MCA 04 for $N_2O$ concentration and<br>• Dr. Födisch FMD 99 for stack gas flow | Calibration:<br>QAL 2 tested by Müller-BBM 2012-09-25 - 2012-09-27 | Calibration:<br>N/A since this is the last JI verification |
| | | QAL3: monthly/ML/ | Subsequent month in 2012 |
| NAP [t $HNO_3$] | FOXBORO IMT 25<br>nitric acid concentration measured by an Anton Paar (mPDS2000) | Calibration: regular cross-check with plant in-/output<br>Last maintenance: | Following month |

| | | | |
|---|---|---|---|
| | | 2012-04-12 of massflow meter | |

## 5.9. Overall Aspects of the Verification

All necessary and requested documentation was provided by the project participants so that a complete verification of all relevant issues could be carried out.

Access was granted to all installations of the plant which are relevant for the project performance and the monitoring activities.

No issues have been identified indicating that the implementation of the project activity and the steps to claim emission reductions are not compliant with the UNFCCC / host country criteria and relevant guidance provided by the COP/CMP and the JISC (clarifications and/or guidance).

## 5.10. Hints for next periodic Verification

No Forward Action Requests have been raised, as this is the last verification for this project activity.

# 6. VERIFICATION OPINION

Yara Montoir Nitric Acid Plant has commissioned the TÜV NORD JI/CDM Certification Program to carry out the 3rd periodic verification (sub period 3.1 and 3.2) of the project: "Yara Montoir $N_2O$ Abatement Project", with regard to the relevant requirements for JI (Track 1) project activities. The project reduces GHG emissions due to reduction of $N_2O$ emissions from the production of nitric acid with secondary $N_2O$ abatement technology (secondary catalyst). This verification covers the sub period (3.2) from 2012-11-15 to 2012-12-31 (including both days).

In the course of the verification 2 Corrective Action Requests (CAR) and 0 Clarification Requests (CL) were raised and successfully closed. The verification is based on the draft monitoring report, revised monitoring report, and the monitoring plan as set out in the registered PDD, the determination report, emission reduction calculation spreadsheet and supporting documents made available to the TÜV NORD JI/CDM CP by the project participant.

As a result of this verification, the verifier confirms that:

- all operations of the project are implemented and installed as planned and described in the project design document.
- the monitoring plan is in accordance with the applied country specific methodology: Méthode pour les Projets Domestiques: "Réduction catalytique du N2O dans des usines d'acide nitrique".
- the installed equipment essential for measuring parameters required for calculating emission reductions are calibrated appropriately.
- the monitoring system is in place and functional. The project has generated GHG emission reductions.

As the result of the 3.2 sub periodic verification, the verifier confirms that the GHG emission reductions are calculated without material misstatements in a conservative and appropriate manner. TÜV NORD JI/CDM CP herewith confirms that the project has achieved emission reductions in the above mentioned reporting period as follows:

Emission reductions: **14,063** t $CO_2e$

| | |
|---|---|
| Essen, 2013-03-01 | Essen, 2013-03-01 |
| Rainer Winter | Eric Krupp |
| TÜV NORD JI/CDM CP | TÜV NORD JI/CDM CP |
| Verification Team Leader | Final Approval |

# 7. REFERENCES

**Table 7-1:** Documents provided by the project participant(s)

| Reference | Document |
|---|---|
| /**APP**/ | Application for approval of a first track JI project activity. |
| /**ARRETEL**/ | Letter concerning 'Arrêté Préfectoral' issued by the Prefecture de Loire - Atlantique on 2010-03-31 regarding max. Emission from Nitric Acid plant. (Regulatory Emissions factor according to the 'arrêté préféctoral' issued by the Préfet de la Loire-Atlantique in 2003 and applicable from 01/09/2005 (1.2 $kgN_2O/tHNO_3$)). |
| /**ARRETE**/ | 'Arrêté préféctoral' issued by the Préfet de la Loire-Atlantique in 2003 regarding max. Emission from Nitric Acid plant (Yara Montoir, applicable from 2005-09-01 (1.2 $kgN_2O/tHNO_3$). |
| /**AST**/ | Annual Surveillance Tests (AST) performed by Müller-BBM on 2011-09-07, Report No. M95 281/1. |
| /**BOTTLE**/ | Test gas bottles ($N_2O$) supplied by Messer Griesheim and stored at the lab-hood on the plant. |
| /**CERT**/ | ISO 9001:2000 and ISO 14001:2004 Certificates, issued by DNV, dated 2010-01-13, valid until 2013-01-03 (Certificate No. 70529-2010-AQFRA). |
| /**CUSUM**/ | Cusum Control Sheet acc. DIN EN 14181 regarding drift of AMS. |
| /**DRAW**/ | Technical drawing of stack including outer diameter and steel thickness of walling. |
| /**FG**/ | Announcement in the German Federal Gazette regarding the suitability of the AMS Dr. Foedisch MCA 04. |
| /**FLOWS**/ | Flow-sheet of nitric acid process. |
| /**FOED-MAIN**/ | Documents issued by AMS-Service-company Dr. Foedisch Umweltmesstechnik GmbH:<br>• Maintenance Protocol Remote Maintenance, dated 2011-09-26 |

| Reference | Document |
|---|---|
| | • Assembly-, Maintenance and Service-Protocol Nr. 0009, dated 2011-02-02 (proof of work)<br>• Maintenance Protocol dated 2011-02-02 |
| /**NAP-XLS**/ | Shift NAP concentration Montoir 21.06 to 21.07 2011: List of Nitric Acid production figures to implement a substitution value |
| /**LOA**/ | • LoA (host country) issued by the French "Ministère de l'Écologie, de l'Énergie, du Développement Durable et de la Mer, en charge des Technologies vertes et des Négociations sur le climat" on 2010-12-30, Ref.-No.: 100010022280.<br>• Revised LoA (host country) issued by the French "Ministère de l'Écologie, de l'Énergie, du Développement Durable et de la Mer, en charge des Technologies vertes et des Négociations sur le climat" on 2012-11-13.<br>• LoA issued by the Belgian Designated Focal Point (DFP), National Climate Commission of Belgium on 2011-04-04, DFP Ref-No.: NKC/FP/6. |
| /**LOG**/ | Parameterisation log of the AMS (VSG-data), provided by Foedisch, dated 2011-03-11 |
| /**MR**/ | • Monitoring report of GHGs emission reductions (2012-11-15 – 2012-12-31) "Yara Montoir $N_2O$ Abatement project" dated 2013-01-11, Ver. 01, issued by N.serve.<br>• Final Monitoring report of GHGs emission reductions (2012-11-15 – 2012-12-31) "Yara Montoir $N_2O$ Abatement project" dated 2013-02-05, Ver. 02, issued by N.serve. |
| /**PARA-N2O**/ | Parameter configuration of the PHD Honeywell system, plot. |
| /**PLOT**/ | Plot of NAP in verification period.<br>Plot of $N_2O$-Concentrations in verification period (Source: XLS). |
| /**QAL1A**/ | • QAL1 Certificate 0000025929 dated 2010-03-10 regarding suitability of the AMS MCA 04 according to DIN EN 14181:2004 issued by TÜV Rheinland.<br>• QAL1 Certificate 0000025929_1 dated 2010-08-02 regarding suitability of the AMS MCA 04 according to DIN EN 14181:2004 issued by TÜV Rheinland.<br>(with extended calibration periods: 3 months). |

| Reference | Document |
|---|---|
| **/QAL1V/** | QAL1 Certificate No: 936/808005/C 2000-04-10 regarding FMD 99 Volumeter, English, issued by TÜV Rheinland.<br>QAL1 Certificate No: 936/808005/C 2000-04-10 regarding FMD 99 Volumeter, German. |
| **/QAL2CALIB/** | Report on performance tests and calibration of the AMS according to EN 14181, Report No. M82 450/2 and M82 450/4, issued by Müller BBM (28 to 30/09/2009).<br>Report on performance tests and calibration of the AMS according to EN 14181, Report No. M101194/01, issued by Müller BBM (25-27/09/2012). |
| **/QPROCE/** | Etalonnage et verification de l'analysateur Cheminée (Quality procedures and instrument verification: "Procedure for calibration and management of maintenance of AMS), No.: HAE-043831, dated 2011-02-25, Ver. 00. |
| **/QPROCI/** | Quality document: Internal Instruction: Gestion du systéme automatique de mesure (AMS) dans le cadre du project de réduction des émissions de N2O (Management of the AMS in the context of the project activity), No.: HAE-043829, dated 2012-03-12 Rev-00-A<br>• Including data management and data storage in the Honeywell-server |
| **/QPROCMP/** | Quality document: Internal instruction: Contróle visuel sur site de analyseur cheminée 05AT4901 de l'atelier Nitrique (Check of displayed information of strategies in case of failure), No.: HAE-043830, Ver. 00, dated 2011-02-25. |
| **/VR/** | JI verification report, 3.1rd Periodic Yara Montoir Nitric Acid Plant Yara Montoir $N_2O$ Abatement Project, Project ID : FR1000213 Monitoring Period: 2012-02-01 TO 2012-11-14 (incl. both days), dated 2013-01-11, issued by TÜV NORD CERT GmbH, JI/CDM Certification Program |
| **/XLS/** | ERU Excel calculation spreadsheet<br>• Calc_N03_2_V01_YARA_Montoir_20130111.xlsx |

**Table 7-2:** Background investigation and assessment documents

| Reference | Document |
|---|---|
| /**14181**/ | European Standard DIN EN 14181: "Stationary source emissions – Quality assurance of automated measuring systems |
| /**AM0034**/ | Approved baseline and monitoring methodology AM0034: "Catalytic reduction of $N_2O$ inside the ammonia burner of nitric acid plants", version 3.4 |
| /**AR**/ | Arrêté du 2 mars 2007 of the 'Ministère de l'écologie et du développement durable (Implementation of the JI-Guidelines in France) |
| /**BACK**/ | Background paper: "$N_2O$ EMISSIONS FROM ADIPIC ACID AND NITRIC ACID PRODUCTION", Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories issued by the NGGIP |
| /**BELGIUM**/ | Rules established by the National Climate Commission for the submission of an application for approval for a project activity… |
| /**BREF**/ | Reference Document on Best Available Techniques for the Manufacture of<br>Large Volume Inorganic Chemicals - Ammonia, Acids and Fertilisers |
| /**CPM**/ | TÜV NORD JI / CDM CP Manual (incl. CP procedures and forms) |
| /**DET**/ | Determination Report of the JI track 1 project:<br>Yara Montoir N2O Abatement Project, Report No.: 600500307, dated 2011-01-18, issued by TÜV Sued. |
| /**DVM**/ | JI Determination and Verification Manual |
| /**GUIDE**/ | Guidance: Developing a CDM or JI project to reduce greenhouse gas emissions, issued by the:<br>• French Ministry for Economy, Industry and Employment<br>• French Ministry for Ecology, Energy, Sustainable Development and Town and Country Planning<br>• French Global Environment Facility |

| Reference | Document |
|---|---|
| **/IPCC/** | 1. 1996 IPCC Guidelines for National Greenhouse Gas Inventories: work book<br>2. 2006 IPCC Guidelines for National Greenhouse Gas Inventories: work book |
| **/KP/** | Kyoto Protocol (1997) |
| **/MA/** | Decision 3/CMP. 1 (Marrakesh – Accords) |
| **/METH/** | Méthode pour les Projets Domestiques<br>Réduction catalytique du $N_2O$ dans des usines d'acide nitrique<br>(Projet Domestique Methodology: Catalytic reduction of $N_2O$ at nitric acid plants) |
| **/METHE/** | Projet Domestique Methodology<br>Catalytic reduction of $N_2O$ at nitric acid plants (Translation of /METH/) |
| **/PDD/** | Project Design Document Version 06 dated 10.08.2010 "YARA Montoir $N_2O$ abatement project" |
| **/PDD-RD/** | Redetermination Project Design Document Version 12 dated 24.09.2012 "YARA Montoir $N_2O$ abatement project" |
| **/SAFE/** | Safety data sheet, YARA N2O Abatement Catalyst 58-Y1, 58-Y1-S in accordance with EU REACH regulation |

**Table 7-3:** Websites used

| Reference | Link | Organisation |
|---|---|---|
| **/belgium/** | http://www.cnc-nkc.be/KLIMAATPLAN/EN/Home/Focalpoint/ApprovalNCC/ | Website of the Belgian DFP |
| **/bref/** | http://eippcb.jrc.ec.europa.eu/reference/ | Website of the European Commission, Joint Research Centre, Institute for |

| Reference | Link | Organisation |
|---|---|---|
| | | Prospective Technological Studies (Provision of BAT-Reference documents) |
| **/dehst/** | http://www.dehst.de | German Emissions Trading Authority (DEHSt) at the Federal Environment Agency |
| **/dfp/** | http://www.developpement-durable.gouv.fr/ | Ministère de l'Écologie, de l'Énergie, du Développement Durable et de la Mer, en charge des Technologies vertes et des Négociations sur le climat |
| **/douane/** | http://www.douane.gouv.fr/data/file/6146.pdf | Web-file regarding $N_2O$ emission taxation. |
| **/gw/** | http://www.global-warming.de/ | TÜV Nord platform hosting projects open for comments at the determination stage |
| **/ipcc/** | www.ipcc-nggip.iges.or.jp | IPCC publications |
| **/lf/** | http://www.legifrance.gouv.fr/ | Site of the Legifrance (La service public de la diffusion du droit) |
| **/mist/** | http://www.ecologie.gouv.fr/Methodologies-de-projets.html | Ministère de l'Écologie, de l'Énergie, du Développement durable et de la Mer (Ministry of ecology and sustainable development) |
| **/nfg/** | http://www.effet-de-serre.gouv.fr/accueil | Mission interministérielle sur l'effet de serre (French Inter-Ministry Mission on the Greenhouse Effect) |
| **/qal1/** | http://qal1.de/de/hersteller/foedisch.htm | www-database of federal environment agency for QAL 1certified AMS |
| **/unfccc/** | http://ji.unfccc.int | JI-FC |

**Table 7-4:** List of interviewed persons

| Reference | Mol[1] | | Name | Organisation / Function |
|---|---|---|---|---|
| **/IM01/** | V | ☒ Mr.<br>☐ Ms | J. Manuel Lizon | Yara Montoir Nitric Acid Plant (Production Manager) |
| **/IM01/** | V | ☒ Mr.<br>☐ Ms | Marc Gres | Yara Montoir Nitric Acid Plant (Process Manager) |
| **/IM01/** | V | ☒ Mr.<br>☐ Ms. | Denis Barthouet | Yara Montoir Nitric Acid Plant (Maintenance Manager) |
| **/IM02/** | V | ☒ Mr.<br>☐ Ms. | Martin Stilkenbäumer | N.serve (Monitoring Expert) |

[1)] Means of Interview: (**T**elephone, **E**-Mail, **V**isit)

# ANNEX

## A1: Verification Protocol

# ANNEX 1: VERIFICATION PROTOCOL

**Table A-1:** GHG calculation procedures and management control testing / detailed audit testing of residual risk areas and random testing

| Identification of potential reporting risk | 1. Identification, assessment and testing of management controls | 2. Areas of residual risks | 3. Additional verification testing | 4. Conclusions and Areas Requiring Improvement (including *Forward Action Requests*) |
|---|---|---|---|---|

| Identification of potential reporting risk | 1. Identification, assessment and testing of management controls | 2. Areas of residual risks | 3. Additional verification testing | 4. Conclusions and Areas Requiring Improvement (including *Forward Action Requests*) |
|---|---|---|---|---|
| | | 5 Raw data generation | | |
| • Installation of measuring equipment<br>• Dysfunction of installed equipment<br>• Maloperation by operational personnel<br>• Downtimes of equipment<br>• Exchange of equipment<br>• Change of measurement equipment characteristic | • Installation of modern and state of the art equipment<br>• Process control automation<br>• Internal data review<br>• Regular visual inspect-ions of installed equip-ment<br>• Only skilled and trained personnel operates the relevant equipment<br>• Daily raw data checks<br>• Immediate exchange of dysfunctional equipment<br>• Stand-by duty is organized | • Inadequate installation / operation of the monitoring equipment<br>• Inadequate exchange of equipment<br>• Change of personnel<br>• Undetected measurement errors<br>• Inappropriateness of Management system procedures w.r.t. monitoring plan requirements (e.g. substitute value strategies)<br>• Non-application of management system procedures<br>• Insufficient accuracy<br>• Inappropriate QA/QC | • Site – visit (maintenance dept., gas supplier)<br>• Check of equipment<br>• Check of technical data sheets<br>• Check of suppliers information / guarantees<br>• Check of calibration records, if applicable<br>• Check of maintenance records<br>• Counter-check of raw data and commercial data<br>• Check of JI manage-ment system<br>• Check of JI related procedures | • **See Table A-2** |

| Identification of potential reporting risk | 1. Identification, assessment and testing of management controls | 2. Areas of residual risks | 3. Additional verification testing | 4. Conclusions and Areas Requiring Improvement (including *Forward Action Requests*) |
|---|---|---|---|---|
| • Insufficient accuracy<br>• Change of technology<br>• Accuracy of values supplied by Third Parties | • Training<br>• Internal audit procedures<br>• Internal check of QA/QC measures of involved Third Parties | measures of Third Parties | • Application of JI management system procedures<br>• Check of trainings<br>• Check of responsibilities<br>• Check of QA/QC documentation / evidences of involved Third Parties | |
| **Raw data collection and data aggregation** | | | | |
| • Wrong data transfer from raw data to daily and monthly aggregated reporting forms<br>• IT Systems<br>• Spread sheet | • Cross-check of data<br>• Plausibility checks of various parameters.<br>• Appropriate archiving system<br>• Clear allocation of responsibilities | • Unintended usage of old data that has been revised<br>• Incomplete documentation<br>• Ex-post corrections of records<br>• Ambiguous sources of information | • Check of data aggregation steps<br>• Counter-calculation<br>• Data integrity checks by means of graphical data analysis and calculation of specific performance | • **See Table A-2** |

| Identification of potential reporting risk | 1. Identification, assessment and testing of management controls | 2. Areas of residual risks | 3. Additional verification testing | 4. Conclusions and Areas Requiring Improvement (including *Forward Action Requests*) |
|---|---|---|---|---|
| programming<br>• Manual data transmission<br>• Data protection<br>• Responsibilities | • Application of JI Management system procedures<br>• Usage of standard software solutions (Spreadsheets)<br>• Limited access to IT systems<br>• Data protection procedures | • Non-application of management system procedures<br>• Manual data transfer mistakes<br>• Unintended change of spread sheet programming or data base entries<br>• Problems caused by updating/upgrading or change of applied software | figures<br>• Check of management system certification<br>• Check of data archiving system<br>• Check of application of Management system procedures | |
| **Other calculation parameters** | | | | |
| • Emission factors, oxidation factors, coefficients | • The values and data sources applied are defined in the PDD and monitoring plan | • Unintended or intended Modification of calculation parameters<br>• Wrong application of values<br>• Misinterpretations of the applied methodology and/ or the PDD | • Update-check of regulatory framework<br>• Countercheck of the applied MP in the MR against the approved version | • **See Table A-2** |

| Identification of potential reporting risk | 1. Identification, assessment and testing of management controls | 2. Areas of residual risks | 3. Additional verification testing | 4. Conclusions and Areas Requiring Improvement (including *Forward Action Requests*) |
|---|---|---|---|---|
| | | • Missing update of applicable regulatory framework (e.g. IPCC values) | | |
| **Calculation Methods** | | | | |
| • Applied formulae<br>• Miscalculation<br>• Mistakes in spread-sheet calculation | • Advanced calculation and reporting tools<br>• A JI coordinator is in charge of the JI related calculations<br>• Usage of tested / counterchecked Excel spreadsheets<br>• Involvement of external consultants | • The danger of miscal-culation can only be minimized. | • Countercheck on the basis of own calculation.<br>• Spread sheet walk-trough.<br>• Plausibility checks<br>• Check of plots | • **See Table A-2** |
| **Monitoring reporting** | | | | |
| • Data transfer to the author of the | • An experienced JI consultant is | • The danger of data transfer mistakes can only be | • Counter check with evidences provided. | • **See Table A-2** |

| Identification of potential reporting risk | 1. Identification, assessment and testing of management controls | 2. Areas of residual risks | 3. Additional verification testing | 4. Conclusions and Areas Requiring Improvement (including *Forward Action Requests*) |
|---|---|---|---|---|
| monitoring report<br>• Data transfer to the monitoring report<br>• Unintended use of outdated versions | responsible for monitoring reporting.<br>• JI QMS procedures are defined | minimized<br>• Inappropriate application of QMS procedures | • Audit of procedure application | |

**Table A-2:** (Project specific) Periodic Verification Checklist

| No. | DVM[3] paragraph / Checklist Item (incl. guidance for the determination team) | Initial Finding (Means and results of assessment) | Ref. | Action requested to PPs (CAR, CL, FAR) | Review of PP´s action | Con-clu-sion |
|---|---|---|---|---|---|---|
| **A** | ***Project Approvals by Parties involved*** | | | | | |
| A.1 | *DVM § 90*<br>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? | *Description:*<br>• The report will be submitted directly to the DFP by the PP because it is a track 1 project.<br>• Written approvals from host and investor countries are available in the project database on the DFP- and UNFCCC-webpage.<br>*Means of determination:* DFP-website, LoA, Unfccc-website, MR<br>*Conclusion:* The LoAs are in line with the JI guidelines. | /LOA/<br>/dfp/<br>/unfccc/ | | | OK |
| A.2 | *DVM § 91*<br>Are all the written project approvals by Parties involved unconditional? | *Description:* The new host country LoA has two conditions, which need to be taken into account:<br>• Only 90 % of the verified emission reductions of one period shall be claimed by the PP. The ERU quantity stated in this report already takes into account the 10% | /ARRET /<br>/ARRET L/ | CAR A1 | ~~CAR A1~~<br>Pls. see Chapter 4 | OK |

[3] JISC 19 Annex 4

| No. | DVM[3] paragraph / Checklist Item (incl. guidance for the determination team) | Initial Finding (Means and results of assessment) | Ref. | Action requested to PPs (CAR, CL, FAR) | Review of PP´s action | Con-clu-sion |
|---|---|---|---|---|---|---|
| | | deduction.<br>• The total amount of verified emission reductions until 2012-12-31 is limited to 185,437 tonnes after 10% deduction.<br>• As reference scenario, the benchmark values of the methodology or maximum emission limits set by the government must be used.<br>*Means of determination: French Method,* plant specific "Arrêté Préfectoral", LoA, PDD, MR, and XLS-spreadsheet.<br>*Conclusion:*<br>**CAR A1:** Based on related FAR, raised during previous verification: The number of ERUs from former verifications and the ERUs of the actual period shall not exceed the cap defined in the new French LoA of 185,437 tonnes of $CO_2e$ (after 10% deduction).<br>Remark:<br>The applicable benchmark value set by the French government is higher than the emission level set by the local government (specific regulatory Emissions Factor according to plant specific "Arrêté Préfectoral"). | /METH/ /LOA/ /PDD/ /PDD-RD/ /XLS/ /MR/ /dfp/ /unfccc/ /AP/ /VR1/ | | | |
| **B** | ***Project implementation*** | | | | | |
| B.1 | *DVM § 92* | *Description:* Within the project, $N_2O$ emissions from the | /IM01/ | | | OK |

| No. | DVM[3] paragraph / Checklist Item (incl. guidance for the determination team) | Initial Finding (Means and results of assessment) | Ref. | Action requested to PPs (CAR, CL, FAR) | Review of PP´s action | Con-clu-sion |
|---|---|---|---|---|---|---|
| | Has the project been imple-mented in accordance with the PDD regarding which the determination has been deemed final and is so listed on the UNFCCC JI website? | production of nitric acid at the Montoir Nitric acid plant will be reduced by installation of a secondary YARA $N_2O$ abatement technology. In April 2012, the plant operator improved the basket design and added additional basket material for a deeper catalyst bed.<br><br>The efficiency of the $N_2O$ abatement system is significantly higher as estimated since the changes in April 2012, when new and improved basket, plus an increased quantity of catalyst, were installed.<br><br>The project installations (Abatement catalyst, AMS) were checked by the verification team and compared with the description given in the registered and re-determinated PDD. The installation of the abatement catalyst and monitoring system is in line with the PDD: The description of the project activity is complete, accurate and correct.<br><br>The technology and know-how used in the project activity is assessed to be environmentally safe and sound.<br><br>*Means of determination:* Interviews, PDD, certificates provided by the PP, on-site visit<br><br>*Conclusion:*<br>The verification team has checked visit the project implementation during the onsite and can confirm that the project runs according to the PDD. | /IM02/<br>/PDD/<br>/PDD-RD/<br>/QAL1A/<br>/QAL1V/<br>/QAL2 CALIB/<br>/QAL2INST/<br>/MR/<br>/14181/<br>/AST/<br>/QPRO CMP/<br>/QPRO CI/<br>/QPRO CE/ | | | |

| No. | DVM[3] paragraph / Checklist Item (incl. guidance for the determination team) | Initial Finding (Means and results of assessment) | Ref. | Action requested to PPs (CAR, CL, FAR) | Review of PP´s action | Con-clu-sion |
|---|---|---|---|---|---|---|
| | | Documentation of inspection, calibration, verification, (preventive) maintenance and malfunction is implemented in the QM system as electronic control cards (SAP)/QA./<br><br>The Dr. Födisch MCA 04 Gas Analyzer and FMD 99 stack gas flow meter, both have QAL1 approval as specified by EN ISO 14956. According to EN 14181 the most recent QAL2 test was conducted by the service company Müller-BBM in 2012 and the Annual Surveillance Tests (AST) was performed by Müller-BBM.<br><br>The project has been implemented in accordance with the PDD regarding which the determination has been deemed final and is so listed on the UNFCCC JI website. | /DRAW/ | | | |
| B.2 | *DVM § 93*<br><br>What is the status of operation of the project during the monitoring period? | *Description:* The project is running according to the description provided in the re-determined PDD.<br><br>*Means of determination:* Calculation sheets annexed to the monitoring report, PDD, interviews, on-site visit and inspection of implementations.<br><br>*Conclusion:* The project is in accordance to the description provided in the re-determined PDD and every other stipulation or requirement mentioned in all sections of the methodology. | /IM01/<br>/IM02/<br>/PDD/<br>/PDD-RD/<br>/XLS/<br>/MR/ | OK | | OK |
| **C** | ***Compliance with monitoring plan*** | | | | | |

| No. | DVM[3] paragraph / Checklist Item (incl. guidance for the determination team) | Initial Finding (Means and results of assessment) | Ref. | Action requested to PPs (CAR, CL, FAR) | Review of PP´s action | Con-clu-sion |
|---|---|---|---|---|---|---|
| C.1 | *DVM § 94*<br>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? | *Description:*<br>*Description:* Monitored parameter and parameter (according to the methodology and the registered PDD) used for calculation are:<br>• $NCSG_n$ [mg $N_2O/Nm^3$]<br>*Meaning:*<br>Average $N_2O$ concentration in the tail gas during project Verification Period n.<br>*Source:*<br>Continuous emissions $N_2O$ analyser (part of AMS)<br>*Measurement frequency:*<br>Hourly value based on continuous monitoring<br>*Storage frequency:*<br>10 sec<br>• $VSG_n$ [$Nm^3/h$]<br>*Meaning:*<br>Average Volume flow rate of the tail gas during project Verification Period n. | /PDD/<br>/PDD-RD/<br>/DET/<br>/MR-1/<br>/14181/<br>/ARRETE/<br>/ARRETEL/ | OK | | OK |

| No. | DVM[3] paragraph / Checklist Item (incl. guidance for the determination team) | Initial Finding (Means and results of assessment) | Ref. | Action requested to PPs (CAR, CL, FAR) | Review of PP´s action | Con-clu-sion |
|---|---|---|---|---|---|---|
| | | *Source:*<br>Gas volume flow meter (part of AMS)<br>*Measurement frequency:*<br>Hourly value based on continuous monitoring (10 second frequency)<br>*Storage frequency:*<br>10 sec<br>• $PE_n$ [kgN2O]<br>*Meaning:*<br>$N_2O$ emissions during project Verification Period n.<br>*Source:*<br>Calculated from measured data<br>*Measurement frequency:*<br>Calculated after each Verification Period<br>*Applied value:*<br>Calculated according to the methodology:<br>$PE^n = VSG_n * NCSG_n * OH_n * 10^{-6}$<br>• $OH_n$ [h] | | | | |

| No. | DVM[3] paragraph / Checklist Item (incl. guidance for the determination team) | Initial Finding (Means and results of assessment) | Ref. | Action requested to PPs (CAR, CL, FAR) | Review of PP´s action | Con-clu-sion |
|---|---|---|---|---|---|---|
| | | *Meaning:*<br>Total operating hours of Verification Period n.<br>*Source:*<br>Plant status signal, $NH_3$ valve status signal, trip point parameters.<br>*Measurement frequency:*<br>Continuous<br>• $NAP_n$ [$tHNO_3$]<br>*Meaning:*<br>Metric tonnes of 100% concentrated nitric acid during any Verification Period n.<br>*Source:*<br>Nitric acid flow meter with mass flow and concentration measurements. In case of malfunction of automatic measurements the manual log of the plant shift was used<br>*Measurement frequency:*<br>Continuously throughout the Verification Period n.<br>• OT [℃] | | | | |

| No. | DVM[3] paragraph / Checklist Item (incl. guidance for the determination team) | Initial Finding (Means and results of assessment) | Ref. | Action requested to PPs (CAR, CL, FAR) | Review of PP´s action | Con-clu-sion |
|---|---|---|---|---|---|---|
| | | *Meaning:*<br>Oxidation temperature in the ammonia oxidation reactor (AOR).<br>*Source:*<br>3 thermocouples inside the AOR. If two out of three are outside the trip points, the plant stops. An additional thermocouple located at the same place is used for registration of OT. If this device detects a temperature which is in the specification, the plant is considered to be in operation.<br>*Measurement frequency:*<br>Hourly average value based on continuous monitoring<br>• OP [Bar]<br>*Meaning:*<br>Pressure inside the ammonia oxidation reactor (AOR).<br>*Source:*<br>Pressure probes at the AOR inlet (Ammonia/Air mixture). The trip point is 3.5 bar but the maximum possible pressure in the AOR is 3 bars according to the compressor performance. The max. pressure measured | | | | |

| No. | DVM[3] paragraph / Checklist Item (incl. guidance for the determination team) | Initial Finding (Means and results of assessment) | Ref. | Action requested to PPs (CAR, CL, FAR) | Review of PP´s action | Con-clu-sion |
|---|---|---|---|---|---|---|
| | | during this period is below 3 bar.<br>*Measurement frequency:*<br>Hourly average value based on continuous monitoring<br>• AFR [$Nm^3NH_3/h$]<br>*Meaning:*<br>Ammonia Flow rate to the ammonia oxidation reactor (AOR)<br>*Source:*<br>Continuous emissions ammonia flow meter<br>*Measurement frequency:*<br>Hourly average value based on continuous monitoring<br>• AIFR [%]<br>*Meaning:*<br>Ammonia to air ratio into the AOR<br>*Source:*<br>Ammonia & Air flow meters<br>*Measurement frequency:*<br>Hourly average value based on continuous monitoring | | | | |

| No. | DVM[3] paragraph / Checklist Item (incl. guidance for the determination team) | Initial Finding (Means and results of assessment) | Ref. | Action requested to PPs (CAR, CL, FAR) | Review of PP´s action | Con-clu-sion |
|---|---|---|---|---|---|---|
| | | • TSG [℃]<br>*Meaning:*<br>Temperature of stack gas<br>*Source:*<br>Probe (part of the gas volume flow meter).<br>*Measurement frequency:*<br>Hourly average value based on continuous monitoring<br>• PSG [Pa]<br>*Meaning:*<br>Pressure of stack gas<br>*Source:*<br>Probe (part of the gas volume flow meter).<br>*Measurement frequency:*<br>Hourly average value based on continuous monitoring<br>• $EF_n$ [$kgN_2O/tHNO_3$]<br>*Meaning:*<br>Emissions factor calculated for project Verification | | | | |

| No. | DVM[3] paragraph / Checklist Item (incl. guidance for the determination team) | Initial Finding (Means and results of assessment) | Ref. | Action requested to PPs (CAR, CL, FAR) | Review of PP´s action | Con-clu-sion |
|---|---|---|---|---|---|---|
| | | Period n.<br>*Source:*<br>Calculated from measured data<br>• $EF_{reg}$ [$kgN_2O/tHNO_3$]<br>*Meaning:*<br>Emissions cap for $N_2O$ from nitric acid production set by government/local regulation.<br>*Source:*<br>National or local $N_2O$ emissions legislation /AP/<br>In this case, the regulatory limit is lower than the applicable benchmark emissions factor, thus $EF_{reg}$ replaces $EF_{BM}$ in the calculation of ERUs.<br>• $EF_{BM}$ [$kgN_2O/tHNO_3$]<br>*Meaning:*<br>Specific reference value (benchmark emission factor) that will be applied to calculate the emissions reductions from a specific Verification Period (not applicable in this project).<br>*Source:* | | | | |

| No. | DVM[3] paragraph / Checklist Item (incl. guidance for the determination team) | Initial Finding (Means and results of assessment) | Ref. | Action requested to PPs (CAR, CL, FAR) | Review of PP´s action | Con-clu-sion |
|---|---|---|---|---|---|---|
| | | Included in the French Methodology<br>QA/QS:<br>The PP refers to the project European standard 14181 regarding implementation of monitoring equipment and maintenance procedures.<br>*Means of determination:* PDD, Monitoring report, ERU-calculation, DIN EN 14181, methodology, quality related procedures provided by the plant staff, on-site inspections and interviews with involved staff.<br>*Conclusion:* The verification team can confirm that the monitoring of the relevant parameter implemented in the project and the referenced standards are in accordance with the monitoring plan of the final PDD. Matter of detailed checks were i.e.:<br>• Measurement frequency<br>• Data source<br>• Measurement procedures<br>• Quality procedures<br>• Measuring points<br>• Cross checks<br>• Data handling, storage and processing | | | | |

| No. | DVM[3] paragraph / Checklist Item (incl. guidance for the determination team) | Initial Finding (Means and results of assessment) | Ref. | Action requested to PPs (CAR, CL, FAR) | Review of PP´s action | Con-clu-sion |
|---|---|---|---|---|---|---|
| C.2 | *DVM § 95a)*<br>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? | *Description:* Project baselines are set by default values in the French methodology which was issued by the French DFP. Default values are expressed in benchmark values [kg $N_2O$/t $HNO_3$]:<br>Year: 2010 2011 2012<br>Value: 2.5 2.5 1.85<br>For Yara Montoir Nitric acid plant the applicable benchmark value is limited lower than the nationwide benchmark emissions factors. The specific regulatory Emissions Factor according to plant specific "Arrêté Préfectoral" is:<br>• 1.2 kg$N_2O$/t$HNO_3$.<br>This benchmark factor resp. emission limitation by local government is the key factor which influences the baseline scenario and reduces the accountable emission reductions from realistic baseline emissions to the above mentioned values.<br>The results of risk assessment are extensive measures to prevent a bypass of process gases in the catalyst bed since this will lead to a reduction of catalyst efficiency. Decreasing catalyst efficiency was identified as most important project risk<br>*Means of determination:* plant specific "Arrêté Préfectoral", French methodology, LoA, PDD | /METH/<br>/LoA/<br>/DVM/<br>/AP/<br>/PDD/<br>/DVM/ | OK | | OK |

| No. | DVM[3] paragraph / Checklist Item (incl. guidance for the determination team) | Initial Finding (Means and results of assessment) | Ref. | Action requested to PPs (CAR, CL, FAR) | Review of PP´s action | Con-clu-sion |
|---|---|---|---|---|---|---|
| | | *Conclusion:* The benchmark values are correctly considered in the calculation of baseline emissions and take into account the sectoral reform policies and legislation (point 23 (b) (i) of DVM).<br>The verification team can confirm, that the result of risk assessment (risks associated with the project) was taken into account. | | | | |
| C.3 | *DVM § 95b)*<br>Are data sources used for calculating emission reductions or enhancements of net removals clearly identified, reliable and transparent? | *Description:* Parameter and related data sources are:<br>• $NCSG_n$ [mg $N_2O/m^3$]<br>Dr. Födisch MCA 04 Continuous Emissions $N_2O$ Analyser (part of the AMS)<br>• $VSG_n$ [$Nm^3/h$]<br>Dr. Födisch FMD 99 gas volume flow meter (differential pressure sensor is a part of the AMS)<br>• $PE_n$ [kg$N_2O$<br>Calculation from measured data<br>• $OH_n$ [h]<br>Production Log – taking into account: plant status signal, $NH_3$ valve status signal, trip point parameters | /PDD/<br>/PDD-RD/<br>/METH/<br>/PDD/<br>/MR-1/<br>/XLS/<br>/IM01/<br>/IM02/<br>/DRAW/<br>/LOG/<br>FOED- | OK | | OK |

| No. | DVM[3] paragraph / Checklist Item (incl. guidance for the determination team) | Initial Finding (Means and results of assessment) | Ref. | Action requested to PPs (CAR, CL, FAR) | Review of PP´s action | Con-clu-sion |
|---|---|---|---|---|---|---|
| | | • AIFR [%]<br>Ammonia and Air flow meters<br>• TSG [°C]<br>Part of AMS<br>• PSG [Pa]<br>Part of the AMS<br>• $EF_n$ [$kgN_2O/tHNO_3$]<br>For the verification period n the emission factor is: $EF_n = (PE_n / NAP_n)$<br>• $EF_{reg}$ [$kgN_2O/tHNO_3$]<br>The max. $N_2O$-emissions are set by the local government as: 1.2 kg for the complete monitoring period<br>• Uncertainty of AMS (max.: 7.5 %)<br>In case of exceeding the limit of 7.5 % overall uncertainty, the project emissions must be increased (Increase [%] = | MAIN/ | | | |

| No. | DVM[3] paragraph / Checklist Item (incl. guidance for the determination team) | Initial Finding (Means and results of assessment) | Ref. | Action requested to PPs (CAR, CL, FAR) | Review of PP´s action | Con-clu-sion |
|---|---|---|---|---|---|---|
| | | Established uncertainty [%] – Permitted uncertainty (7.5))<br><br>A corresponding deduction must not be applied to the calculation in this period.<br><br>• $NAP_n$ [$tHNO_3$]<br><br>Nitric acid flow meter and density of nitric acid (cumulated)<br><br>• $GWP_{N2O}$ [$tCO_2e/tN_2O$]<br><br>Climate Change 1995, The Science of Climate Change: Summary for Policymakers and Technical Summary of the Working Group I Report, page 22.<br><br>• ERU [ERUs ($tCO_2e$)]<br><br>The ERU-calculation was carried out according to the formula described in the methodology:<br><br>$ERU = ((EF_{reg} - EF_n)/1000 \times NAP \times GWP_{N2O}) * 0.9$<br><br>*Means of determination:* PDD, methodology, monitoring report, on-site visit of plant, PCS and data server<br><br>*Conclusion:* | | | | |

| No. | DVM[3] paragraph / Checklist Item (incl. guidance for the determination team) | Initial Finding (Means and results of assessment) | Ref. | Action requested to PPs (CAR, CL, FAR) | Review of PP´s action | Con-clu-sion |
|---|---|---|---|---|---|---|
| | | The PP could demonstrate that data sources are mainly clearly identified, reliable and transparent. The monitoring occurs in accordance with the monitoring plan included in the PDD.<br>No findings were raised in this context. | | | | |
| C.4 | *DVM § 95c)*<br>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? | *Description:* As described under C.2., the French DFP sets emission factors as benchmark values [kg $N_2O$/t $HNO_3$]:<br>Year: 2010 2011 2012<br>Value: 2.5 2.5 1.85<br>But the plant specific applicable benchmark value (specific regulatory Emissions Factor) at Montoir according to "Arrêté Préfectoral" is limited to a lower value of<br>• **1.2 kg$N_2O$/t$HNO_3$.**<br>*Means of determination:* "Arrêté Préfectoral", Methodology, Monitoring report, XLS calculation spreadsheet.<br>*Conclusion:* The regulatory value, as set by the Prefecture de Loire-Atlantique was correctly included in the emission reduction calculation. The stack gas concentration, which correlates with the emission factor, was mentioned in the report as required per methodology. | /PDD/<br>/PDD-RD/<br>/METH/<br>/MR/<br>/ARETE/<br>/ARETEL/<br>/XLS/ | OK | | OK |
| C.5 | *DVM § 95d)*<br>Is the calculation of emission | *Description:* The transparent calculation of emission reduction follows the methodology described in the PDD. All | /PDD/<br>/PDD- | OK | | OK |

| No. | DVM[3] paragraph / Checklist Item (incl. guidance for the determination team) | Initial Finding (Means and results of assessment) | Ref. | Action requested to PPs (CAR, CL, FAR) | Review of PP´s action | Con-clu-sion |
|---|---|---|---|---|---|---|
| | reductions or enhancements of net removals calculated based on conservative assumptions and the most plausible scenarios in a transparent manner? | data used is based on measurements, therefore no assumptions are used.<br>The calculation includes: A deduction in baseline emission scenario to 1.2 kg $N_2O$/t $HNO_3$ (benchmark values) and a 10% reduction of the verified emission reductions.<br>*Means of determination:* "Arrêté Préfectoral", Methodology, PDD, XLS<br>*Conclusion:* The used methodology, data processing, implementation of the benchmark values and 10% reduction is a conservative approach. | RD/ /METH/ /ARETE/ /ARETE L / /MR/ /XLS/ | | | |
| | ***Applicable to JI SSC projects only*** | | | | | |
| C.6 | *DVM § 96*<br>Is the relevant threshold to be classified as JI SSC project not exceeded during the monitoring period on an annual average basis?<br>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 | *Description:* The project is classified as large-scale project.<br>*Means of determination:* PDD<br>*Conclusion:* N/A. | | | | |

| No. | DVM[3] paragraph / Checklist Item (incl. guidance for the determination team) | Initial Finding (Means and results of assessment) | Ref. | Action requested to PPs (CAR, CL, FAR) | Review of PP´s action | Con-clu-sion |
|---|---|---|---|---|---|---|
| | period determined? | | | | | |
| | ***Applicable to bundled JI SSC projects only*** | | | | | |
| C.7 | *DVM § 97a)*<br>Has the composition of the bundle not changed from that is stated in F-JI-SSCBUNDLE? | *Description:* N/A<br>*Means of determination:* N/A<br>*Conclusion: N/A* | | | | |
| C.8 | *DVM § 97b)*<br>If the determination was conducted on the basis of an overall monitoring plan, have the project participants submitted a common monitoring report? | *Description:* N/A<br>*Means of determination:* N/A<br>*Conclusion: N/A* | | | | |
| C.9 | *DVM § 98*<br>If the monitoring is based on a monitoring plan that provides for overlapping monitoring periods,<br>Are the monitoring periods per component of the project clearly specified in the monitoring report?<br>Do the monitoring periods not | *Description:* N/A<br>*Means of determination:* N/A<br>*Conclusion: N/A* | | | | |

| No. | DVM[3] paragraph / Checklist Item (incl. guidance for the determination team) | Initial Finding (Means and results of assessment) | Ref. | Action requested to PPs (CAR, CL, FAR) | Review of PP´s action | Con-clu-sion |
|---|---|---|---|---|---|---|
| | overlap with those for which verifications were already deemed final in the past? | | | | | |
| **D** | ***Revision of monitoring plan*** | | | | | |
| | ***Applicable only if monitoring plan is revised by project participants*** | | | | | |
| D.1 | *DVM § 99a)*<br>Did the project participants provide an appropriate justification for the proposed revision? | *Description:* N/A<br>*Means of determination:* N/A<br>*Conclusion: N/A* | | | | |
| D.2 | *DVM § 99b)*<br>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? | *Description:* N/A<br>*Means of determination:* N/A<br>*Conclusion: N/A* | | | | |
| **E** | ***Data management*** | | | | | |

| No. | DVM[3] paragraph / Checklist Item (incl. guidance for the determination team) | Initial Finding (Means and results of assessment) | Ref. | Action requested to PPs (CAR, CL, FAR) | Review of PP´s action | Con-clu-sion |
|---|---|---|---|---|---|---|
| E.1 | *DVM § 101a)*<br>Is the implementation of data collection procedures in accordance with the monitoring plan, including the quality control and quality assurance procedures? | *Description:* Data collection is in accordance with the monitoring plan. The monitoring system measures continuously and stores every 10 seconds. The responsible project manager extracts hourly averages for monitored parameters and necessary plant data and sent this after plausibility check to N.serve, which is responsible for correct analysis of the delivered data and calculation of ERUs.<br>Data collection procedures, quality control and quality assurance are implemented as follows:<br>For all $N_2O$ data sets a plausibility check is conducted. All data sets containing implausible values are eliminated from the calculation of the average values. Implausible values are those which are negative or clearly out of the range of "normal operating conditions".<br>Measured values were generated by local measurement and monitoring devices, stored in plant automatic data management server (Honeywell PHD data collection and storage system).<br>During data processing, measured values were evaluated according to statistical methods.<br>The PP chooses a monitoring standard that requires the establishment of a calibration curve according to the international standard EN14181. The correction factors | /PDD/<br>/PDD-RD/<br>/METH/<br>/MR/<br>/QPROCI/<br>/XLS/<br>/DVM/<br>/IM01/<br>/IM02/<br>/EN14181/<br>/QPROCMP/<br>/PARAN2O/<br>/QA/<br>/QPRO | OK | | OK |

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| | | derived from this calibration curve during the QAL2 audit are applied onto both VSG and NCSG-determination.<br><br>• VSG: QAL2 correction factor: 1.061<br>• NCSG: QAL2 correction factor: 0.9482<br>• TSG: QAL2 correction factor: 1.022<br>• PSG: QAL2 correction factor: 1.0<br><br>The uncertainty for $N_2O$ mass flow measurement as calculated during the first QAL2 test is 2.93 % (since 27/09/2012 5.98%) for the lower range of the analyser (0 - 200ppm) and 3.43% for the upper range (to 1000ppm) until 27/09/2012 (new QAL 2 test) after 27/09/2012 is 5.98%. Both values are below the permitted overall uncertainty of 7.5 %.<br><br>Acc. to the methodology, downtimes of the AMS were considered as following: The hourly average was calculated based on the remaining values for the rest of the hour in question. If these remaining values account for less than 50% of the hourly data for one or more parameters, then this hour was eliminated from the calculation and substitute values were used instead.<br>*Means of determination:* Methodology, Monitoring report, | CI/ /QPROCE/ /QAL2 CALIB/ /AST/ | | | |

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| | | on-.site visit of plant incl. control room with data server. The original data (10 second cycle and 1 hour average) as excel file extracted from the data acquisition system sent to N.serve by the plant operator were checked and compared with the ER calculations developed as per the applied methodology.<br>Conclusion: It has been confirmed that the data collection procedures are as per the description in the determined monitoring plan. | | | | |
| E.2 | *DVM § 101b)*<br>Is the function of the monitoring equipment, including its calibration status, is in order? | *Description:* All relevant monitoring instruments incl. the AMS are included in the quality procedures which are established for proper operation of the plant. (Yara Montoir is certified to international standards ISO 9001 Quality Management Systems, ISO 14001 Environmental Management Systems, and OHSAS 18001 Occupational Health and Safety Management Systems carried out by Det Norske Veritas.)<br>*a) AMS:*<br>Additional measures are related to the European Norm EN14181 (2004) "Stationary source emissions - Quality assurance of automated measuring systems":<br>QAL 1: performance approval: the AMS is suitable for purpose and in line with the European norm. The PP | /QAL1A/<br>QAL1V/<br>/FG/<br>/QAL2 CALIB/<br>/FOEDM AIN/<br>/PHD/<br>/QPRO CMP/<br>/QPRO CI/ | OK | | OK |

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| | | provides a QAL1 Certificate 0000025929 dated 2010-03-10 according to DIN EN 14181:2004 issued by TÜV Rheinland.<br><br>QAL 2: The Dr. Födisch MCA 04 Gas Analyzer and FMD 99 stack gas flow meter, both have QAL1 approval as specified by EN ISO 14956. According to EN 14181 the first QAL2 test was conducted by Müller-BBM on 28 to 30/09/2009 (Report No. M82 450/2 and M82 450/4), with successful approval of the AMS. A further successful QAL2 test was carried out on 25-27/09/2012.<br><br>AST: The Annual Surveillance Tests (AST) has been performed by Müller-BBM on 2011-09-07, Report No. M95 281/1.<br><br>QAL 3 (ongoing operation and maintenance) *$N_2O$-Analyzer Zero Calibration* is conducted automatically every 24 hours. Manual calibrations are done at least once per month. Manual span calibrations are done with certified test gas at least once per month and the calibration results are all documented as part of the QAL3 documentation.<br>The flow meter FMD 99 itself does not need to be calibrated since it is a physical device without drift. Physical inspection of the condition (assembly/maintenance and service) is checked/done by Dr. Födisch Umweltmesstechnik AG. In addition, the flow meter is checked during the QAL2 and | /QPROCI/<br>QPROCE/<br>/CERT/<br>/IM01/<br>/IM02/<br>/AST/ | | | |

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| | | AST tests by Müller-BBM.<br><br>*b) Other monitoring installations, equipment and devices:*<br><br>Operation maintenance and calibration intervals are carried out by qualified and trained staff of the instrument department according to the vendor´s specification. Activities are controlled and documented as part of an electronic overall quality assurance programme.<br><br>*Conclusion:* The PP implemented a quality assurance system to prove the ongoing compliance of the AMS with the norm. The most maintenance activities are monitored and controlled as part of an electronic overall quality assurance programme. | | | | |
| E.3 | *DVM § 101c)*<br><br>Are the evidence and records used for the monitoring maintained in a traceable manner? | *Description:* The nitric acid plant is equipped with a Honeywell PHD data collection and storage system (DCS), which records and stores all monitoring values for NCSG, VSG, TSG, PSG, as well as different status signals of the AMS and the $NH_3$ valve status signal from the nitric acid plant that defines whether or not the plant is in operation. All monitoring data are collected from plant on 10 second basis. A data extract of hourly mean values (excel) is reported to | /XLS/<br>/PROCI/ | OK | | OK |

| No. | DVM[3] paragraph / Checklist Item (incl. guidance for the determination team) | Initial Finding (Means and results of assessment) | Ref. | Action requested to PPs (CAR, CL, FAR) | Review of PP´s action | Con-clu-sion |
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| | | N.serve.<br>*Means of determination:* The original spreadsheets created by the DCS have been checked and the functioning of DCS was checked during the on-site visit (spot-check of single hours and days).<br>*Conclusion:* The evidences and records used for the monitoring are maintained in a traceable manner. The verifier can confirm that all data are traceable from measurement-device to ER-calculation | | | | |
| E.4 | *DVM § 101d)*<br>Is the data collection and management system for the project in accordance with the monitoring plan? | *Description:* The data collection and the management system are conducted as per the description in the determined monitoring plan. The data acquisition system records the hourly average data which is sent to N.serve for the quality and plausibility check, statistical analysis and final emission reduction calculation.<br>*Means of determination:* by means of interview with the plant operator and N.serve representatives.<br>*Conclusion:* No further issues were found in this regard. | /PHD/<br>/PDD/<br>/PDD-RD/<br>/MR/<br>/XLS/ | OK | | OK |
| **F** | ***Verification regarding programmes of activities (additional elements for assessment)*** | | | | | |
| F.1 | *DVM § 102*<br>Is any JPA that has not been added to the JI PoA not verified? | *Description:* N/A<br>*Means of determination:* N/A | | | | |

| No. | DVM[3] paragraph / Checklist Item (incl. guidance for the determination team) | Initial Finding (Means and results of assessment) | Ref. | Action requested to PPs (CAR, CL, FAR) | Review of PP´s action | Con-clu-sion |
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| | | *Conclusion: N/A* | | | | |
| F.2 | *DVM § 103*<br>Is the verification based on the monitoring reports of all JPAs to be verified? | *Description:* N/A<br>*Means of determination:* N/A<br>*Conclusion: N/A* | | | | |
| F.3 | *DVM § 103*<br>Does the verification ensure the accuracy and conservativeness of the emission reductions or enhancements of removals generated by each JPA? | *Description:* N/A<br>*Means of determination:* N/A<br>*Conclusion: N/A* | | | | |
| F.4 | *DVM § 104*<br>Does the monitoring period not overlap with previous monitoring periods? | *Description:* N/A<br>*Means of determination:* N/A<br>*Conclusion: N/A* | | | | |
| F.5 | *DVM § 105*<br>*If the AIE learns of an erroneously included JPA,* has the AIE informed the JISC of its findings in writing? | *Description:* N/A<br>*Means of determination:* N/A<br>*Conclusion: N/A* | | | | |

| No. | DVM[3] paragraph / Checklist Item (incl. guidance for the determination team) | Initial Finding (Means and results of assessment) | Ref. | Action requested to PPs (CAR, CL, FAR) | Review of PP´s action | Con-clu-sion |
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| | ***Applicable to sample-based approach only*** | | | | | |
| F.6 | *DVM § 106*<br>*Does the sampling plan prepared by the AIE:*<br>*(a) Describe its sample selection, taking into account that:*<br>*(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:*<br>*- The types of JPAs;*<br>*– The complexity of the applicable technologies and/or measures used;*<br>*– The geographical location of* | *Description:* N/A<br>*Means of determination:* N/A<br>*Conclusion: N/A* | | | | |

| No. | DVM[3] paragraph / Checklist Item (incl. guidance for the determination team) | Initial Finding (Means and results of assessment) | Ref. | Action requested to PPs (CAR, CL, FAR) | Review of PP´s action | Con-clu-sion |
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| | *each JPA;*<br>*– The amounts of expected emission reductions of the JPAs being verified;*<br>*– The number of JPAs for which emission reductions are being verified;*<br>*– The length of monitoring periods of the JPAs being verified; and*<br>*– The samples selected for prior verifications, if any?*<br>*(ii) If, in its sample selection, the AIE does not identify and take into account such differences among JPAs, then (does the sampling plan) provide a reasonable explanation and justification for not doing so?*<br>*(b) Provide a list of JPAs* | | | | | |

| No. | DVM[3] paragraph / Checklist Item (incl. guidance for the determination team) | Initial Finding (Means and results of assessment) | Ref. | Action requested to PPs (CAR, CL, FAR) | Review of PP´s action | Con-clu-sion |
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| | *selected for site inspections, based on a statistically sound selection of sites for inspection in accordance with the criteria listed in (a) (i) above?* | | | | | |
| F.7 | *DVM § 107*<br>*Is the sampling plan ready for publication through the secretariat along with the verification report and supporting documentation?* | *Description:* N/A<br>*Means of determination:* N/A<br>*Conclusion: N/A* | | | | |
| F.8 | *DVM § 108*<br>*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* | *Description:* N/A<br>*Means of determination:* N/A<br>*Conclusion: N/A* | | | | |

| No. | DVM[3] paragraph / Checklist Item (incl. guidance for the determination team) | Initial Finding (Means and results of assessment) | Ref. | Action requested to PPs (CAR, CL, FAR) | Review of PP´s action | Con-clu-sion |
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| | *explanation and justification?* | | | | | |
| F.9 | *DVM § 109*<br>*Is the sampling plan available for submission to the secretariat for the JISC.s ex ante assessment? (Optional)* | *Description:* N/A<br>*Means of determination:* N/A<br>*Conclusion: N/A* | | | | |
| | ***Applicable to both sample based and non-sample based approaches*** | | | | | |
| F.10 | *DVM § 110*<br>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? | *Description:* N/A<br>*Means of determination:* N/A<br>*Conclusion: N/A* | | | | |