VALIDATION REPORT

"N2O ABATEMENT IN HP NITRIC ACID PLANTS AT RASHTRIYA CHEMICALS & FERTILIZERS LIMITED, INDIA"

REPORT NO. 2008-1068

REVISION NO. 01

DET NORSKE VERITAS

VALIDATION REPORT

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Approved by: Trine Kopperud Head of Section	Organisational unit: Climate Change Services
Client: Rashtriya Chemicals & Ferilizers Ltd., Mumbai, India	Client ref.: Mr. P.M.C.Nair

Project Name: N_2O abatement in HP Nitric Acid plants at Rashtriya Chemicals & Fertilizers Limited, India
Country: India
Methodology: AM0034
Version: 03.2
GHG reducing Measure/Technology: Catalytic reduction of N_2O inside the ammonia burner by installing secondary catalyst
ER estimate: 447 305 t CO_2e/year
Size
☒ Large Scale
☐ Small Scale
Validation Phases:
☒ Desk Review
☒ Follow up interviews
☒ Resolution of outstanding issues
Validation Status
☒ Corrective Actions Requested
☒ Clarifications Requested
☒ Full Approval and submission for registration
☐ Rejected

In summary, it is Det Norske Veritas Certification AS's (DNV) opinion that the "N_2O abatement in HP Nitric Acid plants at Rashtriya Chemicals & Fertilizers Limited, India" project as described in the PDD, version 1.2 of 21 July 2009, meets all relevant UNFCCC requirements for the CDM and all relevant host Party criteria and correctly applies the baseline and monitoring methodology AM0034 version 3.2. Hence, DNV requests the registration of the project as a CDM project.

Marked in yellow Marked in yellow

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Report title:
N_2O abatement in HP Nitric Acid plants at Rashtriya Chemicals & Fertilizers Limited, India

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Clean Development Mechanism

Abbreviations

AFR	Ammonia Flow to Reactor
AIFR	Ammonia to Air Ratio to reactor
AOR	Ammonia Oxidation Reactor
BC	Baseline campaign
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CEM	Continuous Emission Monitoring system
CER	Certified Emission Reduction
CL	Clarification request
CH_4	Methane
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
CPCB	Central Pollution Control Board
DNV	Det Norske Veritas
DNA	Designated National Authority
EIA	Environment Impact Assessment
GHG	GHG Greenhouse gas(es)
GWP	Global Warming Potential
HNO_3	Nitric Acid
HP	High Pressure
IPCC	Intergovernmental Panel on Climate Change
MoEF	Ministry of Environment & Forests
MIS	Management Information Systems
NCSG	N2O concentration in stack gas
NAP	Nitric acid production
NDIR	Non dispersive infrared absorber
NSCR DeNOx	Non Selective Catalytic Reduction DeNOx unit
N_2O	Nitrous oxide
ODA	Official Development Assistance
OH	Operating hours
O&M	Operation & maintenance
PDD	Project Design Document
RCF	Rashtriya Chemicals & Fertilizers Ltd.
SCR DeNOx	Selective Catalytic Reduction DeNOx unit
TPD	Tons per day
UNC	Overall uncertainty of the monitoring system
UNFCCC	United Nations Framework Convention on Climate Change
VSG	Volume of stack gas

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VALIDATION REPORT

1 EXECUTIVE SUMMARY – VALIDATION OPINION

Det Norske Veritas Certification AS (DNV) has performed a validation of the "N_2O abatement in HP Nitric Acid plants at Rashtriya Chemicals & Fertilizers Limited, India" project. The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism and host Party criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The host Party is India and no Annex I Party project participant is yet identified. India fulfils the participation criteria and has approved the project and authorized the project participant Rashtriya Chemicals & Fertilizers Ltd. The DNA of India has confirmed that the project assists in achieving sustainable development. The validation did not reveal any information that indicates that the project can be seen as a diversion of official development assistance (ODA) funding towards India.

The project involves the installation of secondary catalyst type N_2O abatement measures at the existing nitric acid manufacturing facility at the HP nitric acid plant of Rashtriya Chemicals & Fertilizers Limited, Mumbai, India. The project activity aims to decompose N_2O, (a by-product of the nitric acid plant) present in the tail gas and prior to the project activity being vented to the atmosphere.

The project correctly applies the approved baseline and monitoring methodology AM0034 version 03.2. The determination of the baseline is well elaborated, transparent and sufficiently supported with facts. The selected baseline scenario, i.e. the continuation of the current situation, where there will be no installation of N_2O abatement facility is reasonable for the renewable 7 year crediting period. Moreover, the simple cost analysis and common practice analysis for N_2O abatements in India demonstrate that the project is not a likely baseline scenario. Emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity.

The monitoring plan is in line with the approved monitoring methodology AM0034 version 03.2. The monitoring plan makes sufficient provision for monitoring relevant baseline emission indicators. Detailed responsibilities and authorities for project management, monitoring and reporting and QA/QC procedures have also been envisaged.

The ex-ante GHG emission estimations are calculated and documented in a complete and transparent manner. The algorithm and methodologies for accounting GHG emissions are appropriate and the total emission reductions from the project are estimated to be on the average 447 305 t CO2e per year over the selected first 7 years crediting period.

The project is not expected to create any adverse environmental impacts. The project does not require EIA according to the Indian legislation.

In summary, it is DNV's opinion that the "N_2O abatement in HP Nitric Acid plants at Rashtriya Chemicals & Fertilizers Limited, India", as described in the PDD of version 1.2, dated 21 July 2009, meets all relevant UNFCCC requirements for the CDM and all relevant host Party criteria and correctly applies the baseline and monitoring methodology AM0034 version 03.2. DNV thus requests the registration of the project as a CDM project activity.

2 INTRODUCTION

Rashtriya Chemicals & Fertilizers Ltd. (RCF) has commissioned Det Norske Veritas Certification AS (DNV) to perform the validation of the "N_2O abatement in HP Nitric Acid plants at Rashtriya Chemicals & Fertilizers Limited, India" project (hereafter called "the project"). This report summarises the findings of the validation of the project, performed on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM modalities and procedures and the subsequent decisions by the CDM Executive Board.

2.1 Objective

The purpose of a validation is to have an independent third party assess the project design. In particular, the project's baseline, monitoring plan, and the project's compliance with relevant UNFCCC and host Party criteria are validated in order to confirm that the project design, as documented, is sound and reasonable and meets the identified criteria. Validation is a requirement for all CDM projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of certified emission reductions (CERs).

2.2 Scope

The validation scope is defined as an independent and objective review of the project design document (PDD). The PDD is reviewed against the criteria stated in Article 12 of the Kyoto Protocol, the CDM modalities and procedures as agreed in the Marrakech Accords and the relevant decisions by the CDM Executive Board, including the approved baseline and monitoring methodology AM0034, version 03.2. The validation was based on the recommendations in the Validation and Verification Manual.

The validation is not meant to provide any consulting towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the project design.

3 METHODOLOGY

The validation consisted of the following three phases:

I a desk review of the project design documents

II follow-up interviews with project stakeholders

III the resolution of outstanding issues and the issuance of the final validation report and opinion.

The following sections outline each step in more detail.

3.1 Desk Review of the Project Design Documentation

The following table lists the documentation that was reviewed during the validation:

/1/ RCF: CDM-PDD for *N_2O abatement in HP Nitric Acid plants at Rashtriya Chemicals & Fertilizers Limited, India*, initial version 1.0 of 17 July 2008 and version 1.2 of 21 July 2009.

/2/ Letter of Approval for the project from the DNA of India- Ministry of Environment & Forests, Government of India, dated 18 August 2008.

/3/ CDM Executive Board EB 44: *Validation and Verification Manual*. Version 01

/4/ CDM Executive Board: AM0034, version 03.2 - *Catalytic reduction of N_2O inside the ammonia burner of nitric acid plants.*

/5/ CDM Executive Board: AM0028 version 04.2 - *Catalytic N_2O destruction in the tail gas of nitric acid or Caprolactam Production plants.*

/6/ CDM Executive Board: *Tool for the demonstration and assessment of additionality, version 05.2*

/7/ MoEF: Notification dated 14 September 2006 on requirement of environmental clearance

/8/ RCF: Board notes and Board resolutions for the meeting numbers 266 and 267

/9/ RCF: NIT for CDM advisory services, September 2007

/10/ Tender for stack monitoring system, 19 December 2007

/11/ Letter of Intent for CDM advisory services, 26 December 2007

/12/ RCF: Floating of tender for N_2O abatement catalyst, January 2008

/13/ RCF: Tender for CDM Validation and Verification services, 21 March 2008.

/14/ RCF: Work order to ABB for supply of stack monitoring equipment, 14 March 2008

/15/ RCF: Agreement with BASF for supply of N_2O abatement catalyst, 08 October 2008

/106/ European Norm EN14181: *Quality assurance of automated measuring systems, 2004.*

/117/ RCF: Consent from Maharashtra State Pollution Control Board for operating the Trombay installation, valid upto 31 October 2011

/18/ RCF: Stake holder consultation – advertisements in local news papers *Navshakth*i and *Free Press Journal*, 8 January 2008

/19/ RCF: Letters received from local stake holders.

/20/ RCF: Minutes of Meeting and photographs of local Stake Holder Consultation, 12 March 2008

/21/ RCF: List of participants in the local stakeholder consultation dated 12 March 2008

/22/ RCF: CDM Manual for "*N_2O abatement in HP Nitric Acid plants at Rashtriya Chemicals & Fertilizers Limited", India*, 10 December 2008.

/23/ UHDE: Operating Manual for the high pressure nitric acid plant of RCF, revision 1, October 2003.

/24/ RCF: QMS (ISO 9000) documentation on Calibration schedule of critical measuring and master instruments, revision 1, 31 October 2008.

/25/ TUV-Sud: QAL 1 test report 691317 of 30 June 2006, issued to N_2O analyzers of ABB

/26/ TUV-Sud: QAL 2 test report for the stack monitoring equipment, dated 11 November 2008, issued in accordance with their accredition to DN EN ISO/IEC 17025.

/27/ Chemical composition of wire gauze used for historic and baseline campaigns from Heraeus Gmbh & Co KG

/28/ RCF: Work order for fabrication of wire gauze

/29/ RCF: Spread sheet for determination of operating conditions

/30/ RCF: Spread sheet for determination of baseline emissions

/31/ RCF: Spread sheet for emission reduction calculations

/32/ RCF: Estimate of project cost

/33/ RCF: Tender for CDM Validation services, 21 March 2008

/34/ RCF: Yearly production highlights for the years 2004-05, 2005-06, 2006-07 and 2007-08

/35/ RCF: invitation letter for stakeholder consultation

/36/ RCF: Letter to state pollution control board informing the intention to implement the CDM project.

/37/ TUV-SUD: email confirming the monitoring frequency of stack parameters to be better than 2 seconds, 20 April 2009.

/38/ Emerson: Letter recommending the calibration of frequency of mass flow meter, 16 April 2009

/39/ ABB: QAL 1 report for the stack monitoring equipment, dated 23 June 2008

/40/ RCF: Monitoring instruments calibration reports –

- QMS/HPNA/INST/FM/1 dated 14/16 August 2008 for oxidation reactor temperature, pressure, ammonia flow to reactor and air flow to reactor

- QMS/HPNA/INST/FM/1 dated 5/6 October 2007 for oxidation reactor temperature, pressure, ammonia flow to reactor and air flow to reactor
- CAL/PRESSTRANS/08 dated 1 July 2008 for stack gas flow transmitter
- CAL/PRESSTRANS/08 dated 1 July 2008 for stack gas pressure transmitter
- CAL/TEMPTRANS/08 dated 1 July 2008 for stack gas temperature
- QMS/HPNA/INST/FM/1 dated 6 October 2008 for span check of stack gas analyser
- Cert.No./CAL/TEMP/08/048 dated 10 October 2008 for product acid temperature
- Central Chemical Laboratories, Chembur, Mumbai : H.0804 and H/0805 dated 23 July 2008 for nitric acid density meter.
- Micro Motion Inc.: Calibration certificate 12031566 for product nitric acid massflow meter , dated 6 June 2008

3.2 Follow-up Interviews with Project Stakeholders

During the period 20 and 21 October 2008, DNV carried out a site visit to RCF's HP nitric acid plant. The following personnel of RCF and project consultants were interviewed for gathering information on the topics listed below:

	Date	Name	Organization	Topic
/41/	20 October 2008 & 21 October 2008	Mr. P.M.C. Nair Mr. A.B.Khare Mr. S.N.Salve Mr. Vijay Mutadak Mr. Rajendra Paradkar	RCF	Details of existing plant Specification of stack monitoring equipment N_2O abatement technology being employed by RCF Start date of the project Project cost estimation Quality management procedures and monitoring plan Stake holder consultation process Environmental regulations
/42/	20 October 2008 & 21 October 2008	Mr. Atul Sanghal	Emergent Ventures India Pvt. Ltd.	Applicability of methodology Additionality arguments Statistical analysis of historic and baseline Campaign data Emission reduction calculations

3.3 Resolution of Outstanding Issues

The objective of this phase of the validation was to resolve any outstanding issues which needed be clarified prior to DNV's positive conclusion on the project design. In order to ensure transparency a validation protocol was customised for the project. The protocol shows in a transparent manner the criteria (requirements), means of verification and the results from validating the identified criteria. The validation protocol serves the following purposes:

- It organises, details and clarifies the requirements a CDM project is expected to meet;
- It ensures a transparent validation process where the validator will document how a particular requirement has been validated and the result of the validation.

The validation protocol consists of three tables. The different columns in these tables are described in the figure below. The completed validation protocol for the "N2O abatement in HP Nitric Acid plants at Rashtriya Chemicals & Fertilizers Limited, India" project is enclosed in Appendix A to this report.

Findings established during the validation can either be seen as a non-fulfilment of CDM criteria or where a risk to the fulfilment of project objectives is identified. Corrective action requests (CAR) are issued, where:

i) mistakes have been made with a direct influence on project results;
ii) CDM and/or methodology specific requirements have not been met; or
iii) there is a risk that the project would not be accepted as a CDM project or that emission reductions will not be certified.

A request for clarification (CL) may be used where additional information is needed to fully clarify an issue.

Validation Protocol Table 1: Mandatory Requirements for CDM Project Activities		
Requirement	***Reference***	***Conclusion***
The requirements the project must meet.	*Gives reference to the legislation or agreement where the requirement is found.*	*This is either acceptable based on evidence provided (**OK**), a **Corrective Action Request (CAR)** of risk or non-compliance with stated requirements or a request for **Clarification (CL)** where further clarifications are needed.*

Validation Protocol Table 2: Requirement checklist				
Checklist Question	***Reference***	***Means of verification (MoV)***	***Comment***	***Draft and/or Final Conclusion***
The various requirements in Table 2 are linked to checklist questions the project should meet. The checklist is organised in different sections, following the logic of the large-scale PDD template, version 03 - in effect as of: 28 July 2006. Each section is then further sub-divided.	*Gives reference to documents where the answer to the checklist question or item is found.*	*Explains how conformance with the checklist question is investigated. Examples of means of verification are document review (DR) or interview (I). N/A means not applicable.*	*The section is used to elaborate and discuss the checklist question and/or the conformance to the question. It is further used to explain the conclusions reached.*	*This is either acceptable based on evidence provided (**OK**), or a c**orrective action request (CAR)** due to non-compliance with the checklist question (See below). A request for clarification (CL) is used when the validation team has identified a need for further clarification.*

Validation Protocol Table 3: Resolution of Corrective Action and Clarification Requests			
Draft report clarifications and corrective action requests	***Ref. to checklist question in table 2***	***Summary of project owner response***	***Validation conclusion***
If the conclusions from the draft Validation are either a CAR or a CL, these should be listed in this section.	*Reference to the checklist question number in Table 2 where the CAR or CL is explained.*	*The responses given by the project participants during the communications with the validation team should be summarised in this section.*	*This section should summarise the validation team's responses and final conclusions. The conclusions should also be included in Table 2, under "Final Conclusion".*

Figure 1 Validation protocol tables

3.4 Internal Quality Control

The validation report has undergone a technical review. The technical review was performed by a technical reviewer qualified in accordance with DNV's qualification scheme for CDM validation and verification.

3.5 Validation Team

Role/Qualification	*Last Name*	*First Name*	*Country*	*Type of involvement*					
				Desk review	Site visit / Interviews	Reporting	Supervision of work	Technical review	Expert input
Project manager/ CDM validator/ Technical team leader	Chandrashekara	Kumaraswamy	India	√	√		√		
GHG auditor	Ramachandran	Ramesh	India	√		√			
GHG auditor	Prabhu	Ravi Kumar	India	√	√	√			
Sector expert	Kopperud	Trine	Norway	√					√
Technical reviewer (Applicant)	Kakaraparthi	Venkata Raman	India					√	
Technical reviewer	Lehmann	Michael						√	

The qualification of each individual validation team member is detailed in Appendix B to this report.

4 VALIDATION FINDINGS

The findings of the validation are stated in the following sections. The validation criteria (requirements), the means of verification and the results from validating the identified criteria are documented in more detail in the validation protocol in Appendix A.
The final validation findings relate to the project design as documented and described in the revised and resubmitted project design documentation of version 1.2 dated 21 July 2009./1/

4.1 Participation Requirements

The project participant from the host Party India is Rashtriya Chemicals & Fertilizers Ltd., a public sector undertaking, under the Ministry of Fertilizers and Chemicals, Government of India. The host Party India meets all the requirements for participating in a CDM project. The Ministry of Environment and Forests (MoEF), the DNA of India, has issued the letter of approval for the project activity on 18 August 2008 /2/ and also confirms that the project contributes to the sustainable development of the host Party. There is no Annex I Party project participant yet identified for the project.

The validation did not reveal any information that indicates that the project can be seen as a diversion of official development assistance (ODA) funding towards India.

4.2 Project Design

The project activity entails installation of a secondary catalyst in the ammonia reactor of HP nitric acid plants, located in the fertilizer complex of Rashtriya Chemicals and Fertilizers Ltd. (RCF) in Mumbai, India. The project activity would help in catalytic reduction of N_2O which is an undesirable by-product of nitric acid production process.

Nitrous oxide (N_2O) is formed as a by-product during the catalytic oxidation of ammonia over a suitable catalyst. Typically 92-96% of the fed ammonia is converted to nitric oxide (NO). The remaining ammonia participates in undesirable side reactions that lead to formation of nitrous oxide (N_2O), among other compounds. This was being vented off in the tail gases in the baseline scenario. In the project activity, RCF proposes to install a secondary catalyst in the ammonia burner of nitric acid unit, after the primary catalyst, and convert N_2O into N_2 and O_2, thereby reducing emission of the greenhouse gas N_2O into atmosphere. RCF is sourcing the catalyst from BASF, an internationally renowned catalyst supplier.

RCF has completed installation of comprehensive monitoring/measurement and recording system complying with the methodological requirements for real-time measurements of N_2O concentration and total volume flow in the stack for the baseline campaign (prior to installation of secondary catalyst) and project activity (post installation of secondary catalyst).

The start date of the project activity is stated to be 14 March 2008, and has been evidenced to be the date of issue of work order to ABB for supply of monitoring equipment /14/. The expected operational lifetime of the project activity is 21 years and is justified. The project applies a renewable crediting period of seven years starting from 1 October 2009 or the date of registration, whichever is later.

4.3 Baseline Determination

The project applies the baseline methodology AM0034 version 03.2 "Catalytic reduction of N_2O inside the ammonia burner of nitric acid plant". The applicability criteria and fulfilment of AM0034 version 03.2 are as follows:

- *Limited to the existing production capacity, where the commercial production had began no later than 31 December 200*5: The plant started the commercial operation in 1968 with a design capacity of 352 ton-HNO_3/day (as 100%). Although the reactor and some major equipment were replaced with new ones in January 2005, the design capacity remains unchanged. DNV verified that the capacity of the revamped plant is 352 t HNO_3/year (as 100%), from the operating manual of the technology supplier M/s. Uhde GmbH /23/. Any other modification affecting the design capacity has not been reported after 31 December 2005.
- *The project activity will not result in the shut down of any existing N_2O destruction facility in the plant:* The HP nitric acid plant of RCF currently does not have any N_2O destruction facility installed.
- *The project activity shall not affect the level of nitric acid production:* The project activity will decompose N_2O in the stack gases by the use of a secondary catalyst and thus the level of nitric acid production is not increased or decreased.
- *There are currently no regulatory requirements or incentives to reduce levels of N_2O emissions from nitric acid plants in the host country*: Currently there is no regulatory requirement or incentives to reduce N_2O emissions from nitric acid plants in India, as evidenced from the pollution control permit for the project proponent, which only specifies the levels for NOx and not for N_20.
- *No N_2O abatement technology is currently installed in the plant:* No N_2O abatement technology was installed in the plant, in the baseline scenario.
- *The project activity will not increase NO_x emissions:* The project activity does not increase the level of NO_x emissions.
- *NO_x abatement catalyst installed, if any, prior to the start of the project activity is not a Non-Selective Catalyst Reduction (NSCR) $DeNO_X$ unit:* A Selective Catalyst Reduction (SCR) $DeNO_X$ unit was installed at the HP nitric acid plant of RCF prior to the project activity
- *Operation of the secondary N_2O abatement catalyst installed under the project activity does not lead to any process emissions of greenhouse gases, directly or indirectly:* The secondary catalyst system does not consume any additional energy. Therefore the project activity will not lead to an increase of GHG emissions directly or indirectly
- *Continuous real-time measurements of N_2O concentration and total gas volume flow can be carried out in the stack:* The N_2O concentration is to be measured at the tail gas stack by a non dispersive infrared sensor (NDIR). The total gas volume flow is to be measured in the tail gas stack by a flow meter. The baseline campaign was carried out from 01 July 2008 to 07 November 2008

.In line with the methodology, the baseline scenario is identified using the procedure for the "*Identification of baseline scenario*" described in the approved methodology AM0028 version 04.2 /5/

Step 1: Identify technically feasible baseline scenario alternatives to the project activity

Five alteratives which would reduce the N_2O emissions (project activity), as stated below have been identified to the project activity

- a) Continuation of the current scenario of venting of N_2O in tail gases
- b) Switch to alternative production method not involving ammonia oxidation process
- c) Alternative use of N_2O by recycling of N_2O as a feedstock for the plant or alternative use of N_2O for external purposes
- d) Installation of NSCR NO_X unit
- e) Installation of primary, secondary (project scenario) or tertiary measure for N_2O destruction
- f) Project activity not implemented as a CDM project

Alternative (b) is eliminated as the nitric acid is conventionally (worldwide) manufactured using the ammonia oxidation process. Alternative (c) is eliminated as the N_2O is present in the tail gases in minute quantities of less than 1%, and it is not economically attractive to isolate and reuse N_2O. Alternative (d) is eliminated as the plant already has a (SCR) DeNOx unit. Alternative (e) is the same as the project activity. Hence, the alternatives remaining are (a) continuation of the present scenario and (e) project activity without CDM revenues.

The following technically feasible alternatives to handle NO_X emissions have also been considered.

- A) The continuation of the current situation, where either a DeNOx-unit is installed or not
- B) Installation of a new Selective Catalytic Reduction (SCR) DeNOx unit
- C) Installation of a new Non-Selective Catalytic Reduction (NSCR) DeNOx unit
- D) Installation of a new tertiary measure that combines NO_X and N_2O emission reduction.

However, since the nitric acid plant already has a SCR- DeNOx unit, the installation of a (NSCR) DeNOx unit or a new tertiary measure is not a technical or financial alternative and hence not considered as an alternatives.

Step2: Eliminate baseline alternatives that do not comply with legal or regulatory requirements

Since there is no regulation or obligation to limit and/or reduce N_2O emission and recycle of N_2O, all the identified alternative scenarios defined are possible.

However in line with the methodology, as the project activity is in a nitric acid plant that is in compliance with N_2O and NOx regulations, the potential baseline scenarios are as follows

a) Continuation of the present scenario.

b) Installation of N_2O destruction or abatement technology (without CDM revenues)

Step 3: Eliminate baseline alternatives that face prohibitive barriers (barrier analysis)

Three types of barrier, have been identified for the alternatives identified. These are the barriers of investment (financially viability), technological and prevailing practice

barriers. None of the barriers are applicable to the alternative (a) continuation of the present scenario. All the barriers apply to the project activity and are detailed in the additionality section. Hence the baseline is that in the absence of any regulations for N_2O emissions, the nitric acid plant would have been operated with N_2O emission to the atmosphere.

Step 4: Identify the most economically attractive baseline scenario alternative

This step is not applicable, since there is only one alternative scenario, continuation of the current scenario.

Step 5: Re-assessment of Baseline Scenario in course of proposed project activity's lifetime:

Sub-step 5a: New or modified NO_X emission legislation

- If new or modified NO_X emission regulations are introduced after the project start, determination of the baseline scenario will be re-assessed by RCF at the start of a new crediting period.

Sub-step 5b: New or modified NO_2 emission legislation

- If legal regulations on N_2O emissions are introduced or changed during the crediting period, the baseline emissions shall be adjusted at the time of implementation of new legislation.

All alternative scenarios discussed comply with legal or regulatory requirements of India. However, they are facing barriers except the continuation of the current scenario. Also, all scenarios except the continuation of the current scenario need substantial amount of initial investment with no economical benefits expected.

The system boundaries are defined properly according to AM0034 version 03.2 as follows:

	GHGs involved	Description
Baseline emissions	CO_2	Excluded: Not required to be accounted for by AM0034
	CH_4	Excluded: Not required to be accounted for by AM0034
	N_2O	Included: A by-product of the ammonia oxidation process
Project emissions	CO_2	Excluded: Not required to be accounted for by AM0034
	CH_4	Excluded: Not required to be accounted for by AM0034
	N_2O	Included: N_2O not decomposed by the project activity

4.4 Additionality

The alternative scenarios defined are compared and discussed according to Step 2 to 5 of AM0028 version 4.2, in section 4.3 above. In accordance with AM0034, the additionality of the project is demonstrated through the Step 2 to 4 of the latest version of *"Tool for demonstration and assessment of additionality (version 05.2) /6/.*

4.4.1 CDM consideration and continued action to secure CDM status

The following evidence demonstrating that the CDM was seriously considered in the decision to proceed with the project activity was provided to DNV:

a) 266th Board meeting of 25 July 2007 /8/, approving the approach for taking up the CDM project in nitric acid plants.
b) 267th Board meeting held on 25/26 October 2007 /8/, approving the modalities for inviting separate quotations for N_2O abatement catalyst, continuous monitoring system (CEM), CDM advisory services and validation services. The board has also taken note of the estimated revenues from the sale of CERs.

Continuing and real actions to secure CDM status in parallel with the physical implementation of the project were demonstrated by the following sequence:

a) Notice Inviting Tender for CDM advisory services , September 2007 /9/
b) Tender for stack monitoring system floated on 19 December 2007 /10/
c) Letter of intent for CDM advisory services issued on 26 December 2007 /11/
d) Newspaper advertisement on 8 December 2007 for stakeholder consultation /18/
e) Floating of tender for N_2O abatement catalyst, January 2008 /12/
f) Issue of work order to ABB for supply of stack monitoring instruments on 14 March 2008 **(Project start date)** /14/
g) Tender for CDM validation services issued on 21 March 2008, /33/
h) Installation of stack monitoring system in June 2008
i) Starting of baseline campaign on 1 July 2008 /30/
j) Completion of PDD on 17 July 2008 /1/
k) Start of validation (publication of PDD for stakeholder comments) on 24 July 2008
l) Host country approval on 18 August 2008 /2/
m) Agreement with BASF for supply of N_2O abatement catalyst on 08 October 2008 / 15/
n) Installation of secondary catalyst on 30 March 2009

4.4.2 Identification of alternatives to the project activity

The selection of alternative scenarios was as described in section 4.3 of this report.

4.4.3 Investment analysis – Choice of approach:

As catalytic N_2O destruction facilities generate no financial or economical benefits other than CDM related income, a simple cost analysis is applied.

4.4.4 Apply simple cost analysis

The project will require an investment of INR 19.4 million towards the cost of catalyst and monitoring equipment, whereas no investment is required for continuation of the current scenario. The cost sheet used for simple cost analysis was provided. The investment was verified from the invoices of the instruments and the catalyst suppliers. /32/

4.4.5 Barrier analysis

As stated in 4.4.4 above, installation of a N_2O abatement unit faces investment barriers. Further, the project is also faces barriers due to prevailing practice. However the current

practice, “Continuation of the current scenario of venting of N_2O in the tail gases” does not face any barriers.

4.4.6 Common practice analysis

The project also faces barriers due to prevailing practice. DNV has verified from literature survey that Deepak Fertilizers and Gujarat Narmada Valley Fertilizers and Chemicals have installed N_2O abatement projects, but these are also under CDM validation. There is no N_2O abatement project that has been implemented without CDM consideration. However the current practice, “Continuation of the current scenario of venting of N2O in the tail gases” is not facing any barriers.

In conclusion, the assessment of the arguments presented above is deemed to sufficiently demonstrate that the project activity itself is not a likely baseline scenario and that emission reductions resulting from the project are additional.

4.5 Monitoring

4.5.1 Parameters Determined ex-ante

4.5.1.1 Determination of operating parameters from Historic Campaign

The optimum range of operating parameters of operation temperature (OT), operation pressure (OP), and ammonia gas flow rate (AFR) as well as ammonia to air ratio (AIFR) (the monitored parameter being ammonia flow to mixed gas flow) and nitric acid production for the baseline campaign run were determined from historic data (of five previous campaigns) from 08 November 2005 to 01 July 2008. The data was sourced from the daily log sheets of the plant, in which hourly reading are recorded by the plant operators routinely. The project participant transferred the data to an excel spreadsheet to perform the statistical analysis according to the methodology.

The permitted range of oxidation temperature and pressure has been determined through a statistical analysis of the historical data in which the time series data has been interpreted as a sample for a stochastic variable /29/. All data that falls within the upper and lower 2.5% percentiles of the sample distribution has been defined as abnormal and has been eliminated. The permitted range of operating temperature and pressure has then been assigned as the historical minimum (value of parameter below which 2.5% of the observations lay) and maximum operating conditions (value of parameter exceeded by 2.5% of observations).

The permitted operating parameters determined through the analysis as stated above is given below.

Parameters	Historical Values	Specification of the facility	Permitted Range	Unit
Oxidation Temp Range	900-863	930-860	900-863	Deg C
Oxidation Pressure Range	6.60-6.26	7.65	6.60-6.26	Barg.
	660-626	765	660-626	kPa

As per the methodology, the upper limits for ammonia flow and ammonia to air ratio also needs to be determined from the historical operating data for the five campaigns. The values determined through the analysis are given below:

Parameters	Historical Values	Specification of the facility	Permitted Range	Unit
Ammonia Flow Rate	6725			Nm^3/ h
(Max)	5113	6075.9	5113	kg/ h
Ammonia - air ratio (Max)	11.9	11.5	11.5	%
Campaign length	44 435			te HNO_3

The recording of daily production log sheets, the calibration and maintenance routines for the parameters referred below are the responsibility of Rashtriya Chemicals & Fertilizers Limited. The related procedures are incorporated into the existing QA/QC management system. The monitoring system, accuracy, range and calibration records of the monitoring instruments were checked during the site visit and these were deemed appropriate.
The validation team conducted crosschecking of the data by sampling randomly picked days of the raw data from the daily logsheets of the nitric acid plant for AOR temperature and pressure, ammonia and air flow rates to AOR and acid production. For the period of historic campaign, no material mistakes were observed in the reported values.

The excel spreadsheet for the statistical analysis /29/ of historic campaign has been verified. The project participant has also demonstrated that the permitted range is within the specification of the facility, except for the ammonia air flow ratio (AIFR), in which case the historic average value of 11.9 was found to be higher than the design specification of the plant at 11.5., hence the value of 11.5 is chosen as the maximum value for AIFR. DNV has independently checked the spreadsheet, operating manual and equipment specifications of the plant and concluded that the determination of the operating parameters is in line with the requirements of the methodology.

4.5.1.2 Determination of Baseline emissions

The project applies the approved monitoring methodology of AM0034 version 03.2. According to AM0034, the project participant installed a NDIR type N_2O analyzer, "ABB AO2000 module URAS 26" and a multiple-point sampling tube type stack gas flow meter with an SDF flow sensor. The selected monitoring equipment complies with the following three levels of quality assurance tests and annual functionality test stipulated by EN14181.

- The specific performance characteristics of the monitoring system chosen by the project are listed in the PDD. These data are in line with QAL 1 report /39/ from the supplier of the N_2O analyzer and the relevant information provided for the performance characteristics for the stack gas flow meter and transmitters. The N_2O stack analyser of ABB also has third party QAL1 certificate issued by TUV-Sud /25/, which is accredited according to ISO 17025.
- The monitoring equipment points of installation and configuration are clearly described in the PDD. The QAL 2 test was conducted by the accredited external agency, TUV-SUD Industrie Service GmbH during the baseline campaign. The determination of the overall measurement uncertainty factor (combined UNC) of the

AMS was also determined after the completion of the QAL 2 test and the QAL 2 report was provided for validation /26/.

- Continuous quality assurance of the monitoring system and annual functionality test by RCF (QAL 3) are properly planned and documented in the PDD. QAL3 is a procedure which is used to check drift and precision in order to demonstrate that the AMS is in control during its operation so that it continues to function within the required specifications for uncertainty. This is achieved by conducting periodic zero and span checks on the AMS and then evaluating the results obtained using control charts. Zero and span adjustments or maintenance of the AMS, may be necessary depending on the results of this evaluation. In addition, Annual Surveillance Tests (AST) should be conducted in accordance with EN14181, these are a series of measurements that need to be conducted by independent measurement equipment in parallel to the existing AMS. DNV verified that zero check of the analyzer was done by RCF every week and span check once in 3 months for the period of baseline campaign.

The RCF HP nitric acid plant is equipped with a data communication unit that collects and stores all the raw values of NCSG, VSG, TSG, PSG, (monitored every 2 seconds) as well as OT_h, OP_h, AFR, AIFR, NAP and different status signals from the CEM. From the data communication unit the data is transferred to the ITBK EMI3000 server grade PC in analyser room. In the EMI3000 PC all the data evaluation and storage takes place. The data is stored simultaneously on different hard disks to prevent the loss of data in case one of the hard disk fails.

The baseline campaign was conducted in the HP nitric acid plant of RCF from 01 July 2008 to 07 November 2008. The following parameters were monitored according to AM0034 version 03.2 and recorded hourly: Operation Temperature (OT), Operation Pressure (OP), and Ammonia gas Flow Rate (AFR) as well as Ammonia to Air Ratio (AIFR) (the monitored parameter being primary air flow) and nitric acid production. In addition, the N_2O concentration and gas volume flow was monitored with an Automated Monitoring System (AMS) which was installed by ABB in June 2008. This monitoring system provides the hourly average readings for the N_2O concentration and gas volume flow. The flow meter is a multi point pitot tube that measures flow, temperature and pressure of the stack gas. The temperature (TSG) and static pressure (PSG) are fed into the flow transmitter where the flow meter does the calculation of volume flow at standard conditions (Nm^3). This is then transmitted down the signal line (4-20 mA) to the data logger. The normalisation was checked as a part of the QAL 2 test performed by TUV-SUD (any error introduced by the T and P is covered in the QAL 2 flow correction factor). When the plant operated outside the permitted range or limit corresponding to normal operating conditions, all the data, except for OH_{BC} and NAP_{BC} for the hour is eliminated for baseline analysis.

The statistical evaluation has been done to eliminate extreme values of VSG and NCSG, according to the procedure in AM0034. The process of evaluation has been documented in a spreadsheet /30/ which was verified by DNV. After applying the statistical analysis according to AM0034 version 03.2, the average value of N_2O concentration and gas volume flow have been calculated to be 4054.1 mgN_2O/Nm^3 and 49 077 Nm^3/h, respectively. During the baseline campaign, 61% of the measured values were within permitted operating ranges.

According to AM0034, at least 50% of the data should be within the normal operating ranges in order to accept the baseline campaign. Statistical analysis was also done to demonstrate that the average values of the baseline operating parameters are representative of normal operating conditions. Hence, in DNV's opinion, the baseline campaign is valid and can be used for determining the baseline emission factor.

RCF fabricates the Platinum-Rhodium wire gauze as per specification, through one of the three approved vendors. The precious metals required for the fabrication are supplied by RCF and the vendors are paid for the labour charges. The primary catalyst applied in the ammonia oxidizer during the baseline campaign was fabricated by RCF in the above lines. Same procedure was used by RCF in the previous five historical campaigns also, and the composition of the primary catalyst in the baseline campaign and historic campaigns are same. /27/, /28/

The nitric acid production is calculated by multiplying the acid flow measured by a mass flow meter with the acid concentration, which is a daily average of the hourly samples analysed at the analytic lab of RCF. The nitric acid produced during the baseline campaign is 43 326 t 100% HNO_3. This value is lower than the CL_{normal} (44 435 t HNO_3), thus the monitored values for VSG and NCSG that were used for the determination of the baseline emission factor is in accordance to AM0034. It was confirmed from the excel sheet for the baseline campaign that the average N_2O concentration (NCSG) and stack gas flow (VSG) were directly taken from AMS and nitric acid production was computed as stated above. Meanwhile, the average daily nitric acid production during baseline campaign is within the design capacity of 352 t HNO_3/day. The production hours in the baseline campaign was 2861 hours which was confirmed from production logs. The baseline emission factor was determined to be 12.5 kg N_2O/t HNO_3 by applying correction factor UNC, as determined during QAL 2. The calculation spreadsheet for the emission factor was verified by DNV and found to be correct.

There are no N_2O emission regulations in India that apply to nitric acid plants at the time of the baseline campaign. DNV also verified the consent to operate the Trombay installations of RCF, issued by the Maharashtra State Pollution Control Board /17/and confirmed that there is no emission limit specified for emissions of N_2O from the nitric acid plant.

The recording of daily production log sheets, the calibration and maintenance routines for the parameters referred below are the responsibility of Rashtriya Chemicals & Fertilizers Limited. The related procedures are incorporated into the existing QA/QC management system. The quality procedures of stack monitoring system are according to EN 14181. The monitoring system, accuracy, range and calibration records /40/ of the monitoring instruments were checked during the site visit and these were deemed appropriate.
The validation team conducted crosschecking of the data by sampling randomly picked days of the raw data from the daily logsheets of the nitric acid plant and the daily reports generated by the stack monitoring system (N_2O concentration,stack gas flow, AOR temperature and pressure, ammonia and air flow rates to AOR). For the period of historic and baseline campaigns, no material mistakes were observed in the reported values.

The following parameters is determined ex-ante, which are summarised in the PDD, section

B.6.2:

Parameter	Tag no./ Value applied	Assessment/Observation Description of monitoring equipment, measurement, calibration routines and uncertainty
AFR_{max} (B.1) Maximum ammonia gas flow rate to the AOR	FT 120211 5113 $kgNH_3/h$	➢ The ammonia flow is recorded in the log sheets on hourly basis. ➢ QA/QC is covered under ISO 9001 quality systems. Calibration frequency is once in a year. Calibration certificates of 5 October 2007 and 16 August 2008 were verified /40/. ➢ Accuracy range of ± 1%. ➢ Historical maximum from campaign data in Nm^3/h was converted to kg/h
$AIFR_{max}$ (B.2) Maximum ammonia to air ratio	FT 120211 and FT 120213 11.5%	➢ The ratio is calculated based on ammonia and air flows recorded in the log sheets on hourly basis. ➢ QA/QC is covered under ISO 9001 quality systems. Calibration frequency is once in a year. Calibration certificates of 5 October 2007 and 16 August 2008 were verified /40/. ➢ Accuracy range of ± 1%. ➢ This value was obtained from the operation manual, since the value obtained during historic campaign was higher.
OT_{normal} (B.3) Normal range for oxidation temperature	TI 120333 863-900 °C	➢ The oxidation temperature is recorded in the log sheets on hourly basis. ➢ QA/QC is covered under ISO 9001 quality systems. Calibration frequency is once in a year. Calibration certificates of 5 October 2007 and 16 August 2008 were verified /40/. ➢ Accuracy range of ± 1% and calibration range of 0 to 1200°C. ➢ Value obtained from historic campaign
$OP_{normal.}$ (B.4) Normal range for oxidation pressure	PT 120212 626 to 660 kPa	➢ The oxidation pressure is recorded in the log sheets on hourly basis. ➢ QA is covered under ISO 9001 quality systems. Calibration frequency is once in a year. Calibration certificates of 5 October 2007 and 16 August 2008 were verified /40/. ➢ Accuracy of ± 1% and calibration range of 0 to 12 Bar.g. ➢ Value obtained from historic campaign The values were converted from Bar.g to kPa

		.
GS_{BL} (B.5) Gauze supplier for the baseline campaign	RCF gets the wire gauze fabricated by one of the three approved vendors by supplying the metals free of cost.	➢ It was verified by DNV from the tender specification and work order issued /27/, /28/
GC_{BL} (B.6) Gauze composition for the baseline campaign	Platinum92%, Rohdium:8%	➢ It was verified by "Certificate of analysis" from Heraeus Gmbh & Co KG/27/.
$NCSG_{BC}$ Mean concentration of N_2O in stack gas during the baseline campaign	Calculated 4 054.1 mg N_2O/Nm^3	➢ Measured by NDIR, "ABB AO2000 URAS 26". Continuously, monitored every 2 seconds, hourly average values recorded Calibration routine based on EN14181 is considered. ➢ Gas filled calibration cells are used for automatic calibration. QAL 3 checks include the zero check and span check once in 3 months by RCF.
VSG_{BC} Mean gas volume flow rate at stack during the baseline campaign period	Calculated 49 077 Nm^3/h	➢ Measured by an SDF flow sensor continuously, monitored every 2 seconds, hourly average values recorded. The gas flow rate is converted to standard conditions by the Beckhoff DATA logger, automatically. Calibration routine based on EN14181. ➢ The calibration is done once in an year. The calibration done on 1 July 2008 /40/ was valid for the baseline campaign.
OH_{BC} Operating hours during the baseline campaign	Calculated 2 861 hours	➢ Recorded by data logging system and aggregated for the baseline campaign.
CL_{BL} Baseline campaign length	Calculated 43 326 $tHNO_3$	➢ Acid flow is measured by mass flow meter. This is multiplied by daily average concentration of nitric acid determine by the plant laboratory to compute the production of 100% HNO_3. ➢ The calibration frequency of mass flow meter is once in 3 years and that of the density meter and product acid thermometer are once in a year. Calibration certificate dated 6 June 2008 of mass flow meter and density meter calibration dated 23 July 2008 /40/ were

		applicable for the baseline campaign.
CL_{normal} Average campaign length for the historic campaigns used to define operating conditions	Calculated 44 435 $tHNO_3$	➢ Historical average campaign length is calculated by taking the average of total quantity of acid produced (as 100%) during the five campaigns. /29/ ➢ The calibration frequency of mass flowmeter is once in 3 years and that of the density meter and product acid thermometer are once in an year.
NAP_{BC} Nitric acid production during the baseline campaign	Calculated 43 326 $tHNO_3$	➢ Acid flow is measured by mass flow meter. This is multiplied by daily average concentration of nitric acid determine by the plant laboratory to compute the production of 100% HNO_3. ➢ The calibration frequency of mass flowmeter is once in 3 years and that of the density meter and product acid thermometer are once in an year.
GS_{normal} Gauze supplier for the historic campaign	Platinum92%, Rohdium:8%	➢ This was verified by DNV from the tender specification and work orders issued /27/, /28/
GC_{normal} Gauze composition for the historic campaign	Platinum92%, Rohdium:8%	➢ This was verified from the test certificate of the wire gauze /27/.
GS_{BL} Gauze supplier for the baseline campaign	Platinum92%, Rohdium:8%	➢ This was verified from the tender specification and work orders issued /27/, /28/

4.5.2 Parameters Determined ex-post

The following parameters will be determined *ex-post* as defined in the below table, these parameters are summarised in the PDD, B.6.3 and B.7.1 of the PDD is in line with the latest CDM-PDD Guideline.

Parameter	**Frequency of monitoring**	**Assessment/Observation Description of monitoring equipment, measurement, calibration routines and accuracy**
NCSG Mean concentration of N_2O in stack gas for the project campaign	Continuously, monitored every 2 seconds, hourly average values recorded	Measured by NDIR, "ABB AO2000 Uras 26". Calibration routine based on EN14181 is considered. Gas-filled calibration cells are used for automatic calibration. QAL 3 checks include the zero check and span check once in 3 months by RCF. AST will be performed once in a year.
VSG Mean stack gas volume	Continuously, monitored every 2 seconds, hourly	Measured by an SDF flow sensor. The gas flow rate is converted to standard

flow rate for the project campaign	average values recorded	conditions by the Beckhoff DATA logger. The calibration frequency is once in a year.
OH Operating hours of AOR during the specific monitoring period	To be recorded daily	Recorded by data logging system
NAP Nitric acid production during a specific project campaign	Acid flow: Continuous Concentration: daily average	Acid flow is measured by mass flow meter. This is multiplied by daily average concentration of nitric acid determine by the plant laboratory to compute the production of 100% HNO3. The calibration frequency of mass flow meter is once in 3 years and that of the density meter and product acid thermometer are once in a year.
TSG Temperature of the stack gas during the project campaign	Continuously, monitored every 2 seconds, hourly average values recorded	To be used for converting the gas flow rate to standard conditions, by the Beckhoff DATA logger. Calibration routine based on EN14181. The calibration frequency is once in an year.
PSG Pressure of the stack gas during the project campaign	Continuously, monitored every 2 seconds, hourly average values recorded in AMS	To be used for converting the gas flow rate to standard conditions, by the Beckhoff DATA logger. Calibration routine based on EN14181. The calibration frequency is once in an year.
AFR Ammonia gas flow rate to AOR	Recorded hourly by FT 120211	Transmitted from DCS to data logger as nm^3/h, which is then converted to kg/h. Calibration frequency is once in an year and accuracy is ± 1%.
UNC Overall uncertainty of the monitoring system	Calculated 4.52%	Calculated by the independent third party agency TUV-SUD during QAL 2 testing of CEM.
AIFR Ammonia to air ratio to AOR	Calculated from the flows measured by FT 120211 and FT 120213	Calculated by data logger using DCS data of ammonia gas flow and air flow to AOR. Calibration frequency is once in a year and accuracy is ± 1%.
OT_h Oxidation temperature of ammonia oxidation reactor (AOR)	Recorded hourly by TI 120333	Monitored by thermocouple at the AOR, data transmitted from DCS to CEM. Calibration frequency is once in an year and accuracy is ± 1%.

OP_h Oxidation pressure of AOR	Recorded hourly by PT 120212	Monitored by pressure gage at AOR inlet of ammonia line. Data transmitted from DCS to CEM. Calibration frequency is once in an year and accuracy is ± 1%.
$GS_{project}$ Gauze supplier for the project campaign	Each campaign	This can be verified from the tender specification and work orders issued
$GC_{project}$ Gauze composition for the project campaign	Each campaign	This can be verified from the test certificate of the wire gauze used .
EF_{reg} Emission level set by incoming policies or regulations	Occasional	Latest Indian national environmental legislation is to be checked

The monitoring equipment selected and the monitoring plan was verified to be appropriate. The frequency of monitoring and the calibration is as per the methodology.

4.5.3 Management system and quality assurance

The authority and responsibility of the project activities are described in the PDD. RCF is certified under ISO: 9001 as well as ISO 14001 management systems. RCF has also prepared a CDM manual /22/, in which all the requirements of monitoring, quality control and training procedures related to the project activity are described. The quality system documents and records are well maintained. The measurement equipment necessary to operate the nitric acid plant have been calibrated properly, according to the documented procedures. It is clearly described that the equipment supplier service team conducting the QAL 2 test has the required accreditation. QAL 1 certificate for the equipment, complying to the standards of EN 14181 and ISO 14956:2000 from the supplier ABB has been evidenced /39/. The N_2O stack analyser of ABB also has third party QAL1 certificate issued by TUV-Sud /25/, which is accredited according to ISO 17025. Further, QAL 3 procedure is outlined properly in the PDD. The downtime management described in the PDD is in line with the AM0034. The specific performance characteristics for the monitoring equipment described in sections B.6 and B.7 of the PDD are in line with AM0034. The retention period of the data is clearly described in the PDD and is in line with AM0034.

4.6 Estimate of GHG Emissions

The emission reduction calculations described in the PDD /1/ and the spread sheet /31/ are in line with AM0034 version 03.2. RCF has completed both historical as well as the baseline campaigns during validation and the data were used for the *ex ante* emission reduction calculations. The default values used for the *ex-ante* and *ex-post* emission reduction calculations are well referenced. Uncertainties in the measurements are sufficiently addressed and are reflected in the overall uncertainty factor determined during the QAL 2 test. The estimated emission reductions are 447 305 tCO_2/ year during the first crediting period.

4.7 Environmental Impacts

The project activity does not require an Environmental Impact Assessment study, according to the latest notification of the Ministry of Environment and Forests (MoEF), Government of India /7/. However, the Project Proponent has intimated State Pollution Control Board of the decision to implement the CDM project. The spent secondary catalyst will be returned back to the supplier for re-processing, as per the agreement /15/. This is in line with the local Hazardous Waste Management & Handling Rules.

4.8 Comments by Local Stakeholders

RCF had published advertisements in local newspapers *Navshakti* (Marathi Daily) and *Free Press Journal* (English Daily) on the project activity /18/. The comments were invited through mail/ email/ phone/ fax. In response to the advertisement, the company has received two comments, one from a local resident and other from the General Secretary– RCF Employees Union /19/. Both have commended the project and appreciated RCF's efforts in reducing the emission of GHG gases.

RCF has also conducted a local meeting on 12 March 2008 at its premises with the employees to apprise them of the project activity and its impact on environmental performance. Comments made by the participants were positive and they generally supported the establishment /20/, /21/.
Copies of press advertisements, letters received from stakeholders and the minutes of meeting were verified by DNV.

4.9 Comments by Parties, Stakeholders and NGOs

The PDD of 17 July 2008 was made publicly available on DNV's climate change website (http://www.dnv.com/focus/climate_change/Projects/ProjectDetails.asp?ProjectId=1955) and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 24 July 2008 to 22 August 2008.

No comments were received.

APPENDIX A

CDM VALIDATION PROTOCOL

Table 1 Mandatory Requirements for Clean Development Mechanism (CDM) Project Activities

Requirement	Reference	Conclusion
About Parties		
1. The project shall assist Parties included in Annex I in achieving compliance with part of their emission reduction commitment under Art. 3.	Kyoto Protocol Art.12.2	OK.
2. The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC.	Kyoto Protocol Art.12.2.	OK
3. The project shall have the written approval of voluntary participation from the designated national authority of each Party involved.	Kyoto Protocol Art. 12.5a, CDM Modalities and Procedures §40a	OK The project has received host country approval from DNA of India.
4. The project shall assist non-Annex I Parties in achieving sustainable development and shall have obtained confirmation by the host country thereof.	Kyoto Protocol Art. 12.2, CDM Modalities and Procedures §40a	OK
5. In case public funding from Parties included in Annex I is used for the project activity, these Parties shall provide an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties.	Decision 17/CP.7, CDM Modalities and Procedures Appendix B, § 2	OK The validation did not reveal any information that indicates that the project can be seen as a diversion of official development assistance (ODA) funding to India
6. Parties participating in the CDM shall designate a national authority for the CDM.	CDM Modalities and Procedures §29	Ministry of Environment & Forests is the DNA of India.
7. The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol.	CDM Modalities §30/31a	The host country India has ratified the Kyoto protocol

Requirement	Reference	Conclusion
		on 26 August 2002.
8. The participating Annex I Party's assigned amount shall have been calculated and recorded.	CDM Modalities and Procedures §31b	Not Applicable
9. The participating Annex I Party shall have in place a national system for estimating GHG emissions and a national registry in accordance with Kyoto Protocol Article 5 and 7.	CDM Modalities and Procedures §31b	Not Applicable
About additionality		
10. Reduction in GHG emissions shall be additional to any that would occur in the absence of the project activity, i.e. a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity.	Kyoto Protocol Art. 12.5c, CDM Modalities and Procedures §43	~~CL 4~~ OK
About forecast emission reductions and environmental impacts		
11. The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.	Kyoto Protocol Art. 12.5b	OK
For large-scale projects only		
12. Documentation on the analysis of the environmental impacts of the project activity, including transboundary impacts, shall be submitted, and, if those impacts are considered significant by the project participants or the Host Party, an environmental impact assessment in accordance with procedures as required by the Host Party shall be carried out.	CDM Modalities and Procedures §37c	The project does not require an EIA as per the latest Notification of MoEF, Government of India.
About stakeholder involvement		
13. Comments by local stakeholders shall be invited, a summary of these provided and how due account was taken of any comments received.	CDM Modalities and Procedures §37b	A meeting was held with local stake holders on the project. No adverse comments were received

Requirement	Reference	Conclusion
		during the meeting.
14. Parties, stakeholders and UNFCCC accredited NGOs shall have been invited to comment on the validation requirements for minimum 30 days, and the project design document and comments have been made publicly available.	CDM Modalities and Procedures §40	The PDD Version 1.0 dated. 17 July 2008 was made published on DNV's climate change website and stakeholders, Parties and NGOs were invited to make comments during 30 days period from 26 June 2008 to 25 July 2008.
Other		
15. The baseline and monitoring methodology shall be previously approved by the CDM Executive Board.	CDM Modalities and Procedures §37e	OK
16. A baseline shall be established on a project-specific basis, in a transparent manner and taking into account relevant national and/or sectoral policies and circumstances.	CDM Modalities and Procedures §45c,d	OK
17. The baseline methodology shall exclude to earn CERs for decreases in activity levels outside the project activity or due to force majeure.	CDM Modalities and Procedures §47	OK
18. The project design document shall be in conformance with the UNFCCC CDM-PDD format.	CDM Modalities and Procedures Appendix B, EB Decision	OK
19. Provisions for monitoring, verification and reporting shall be in accordance with the modalities described in the Marrakech Accords and relevant decisions of the COP/MOP.	CDM Modalities and Procedures §37f	OK

Table 2 Requirements Checklist

CHECKLIST QUESTION	Ref.	MoV *	COMMENTS	Draft Concl.	Final Concl.
A. General Description of Project Activity *The project design is assessed.*					
A.1. Project Boundaries *Project Boundaries are the limits and borders defining the GHG emission reduction project.*					
A.1.1. Are the project's spatial boundaries (geographical) clearly defined?	/1/	DR	Yes. The Project of M/s Rashtriya Chemicals & Fertilizers Limited is located at Sion, Mumbai, Maharashtra, India. The Geographical coordinates of the project are Latitude 18° 56' N and Longitude 72° 51' E.		OK
A.1.2. Are the project's system boundaries (components and facilities used to mitigate GHGs) clearly defined?	/1/	DR/I	The project boundary covers the entire medium pressure (HP) nitric acid production process from the inlet of the ammonia burner to the stack. This includes compressors, tail gas expander turbines and the SCR DeNOx unit installed in the plant. The only greenhouse gas emission from the project is N_2O in the tail gas vented through the stack.		OK
A.2. Participation Requirements *Referring to Part A, Annex 1 and 2 of the PDD as well as the CDM glossary with respect to the terms Party, Letter of Approval, Authorization and Project Participant.*					
A.2.1. Which Parties and project participants are participating in the project?	/1/ /2/	DR/I	For this project, India is the host Party and the public entity, M/s Rashtriya Chemicals &		OK

* MoV = Means of Verification, DR= Document Review, I= Interview

CHECKLIST QUESTION	Ref.	MoV *	COMMENTS	Draft Concl.	Final Concl.
	/		Fertilizers Limited is the Project participant. There is no Annex I Party involved in the project at this stage.		
Have all involved Parties provided a valid and complete letter of approval and have all private/public project participants been authorized by an involved Party?	/1/ /2/	DR/I	Host Party approval has been accorded on 18 August 2008.		OK
A.2.2. Do all participating Parties fulfil the participation requirements as follows: - Ratification of the Kyoto Protocol - Voluntary participation - Designated a National Authority	/1/ /2/	DR/I	The Designated National Authority (DNA) of India is Ministry of Environmental and Forests (MoEF). India ratified the Kyoto Protocol in August 2002.		OK
A.2.3. Potential public funding for the project from Parties in Annex I shall not be a diversion of official development assistance.	/1/ /2/	DR/I	There is no public funding/ diversion of ODA from Annex 1 Parties for the project activity, as confirmed by project proponent during the site visit.		OK
A.3. Technology to be employed *Validation of project technology focuses on the project engineering, choice of technology and competence/ maintenance needs. The validator should ensure that environmentally safe and sound technology and know-how is used.*					
A.3.1. Does the project design engineering reflect current good practices?	/1/ /14/ /15/	DR/I	The project involves the addition of a secondary catalyst in the ammonia oxidation reactor in the nitric acid production process to abate nitrous oxide inside the reactor. The project does not involve any major changes	~~CL 1~~	OK

* MoV = Means of Verification, DR= Document Review, I= Interview

CHECKLIST QUESTION	Ref.	MoV *	COMMENTS	Draft Concl.	Final Concl.
			with regard to the manufacturing technology and reflects current good practices. The following additional documentation shall be provided: (a) Equipment specification/ P.O. (b) Evidence for compliance to EN14181, QAL certification and other relevant standards to be provided for the monitoring equipment.		
A.3.2. Does the project use state of the art technology or would the technology result in a significantly better performance than any commonly used technologies in the host country?	/1/ /14/ /15/	DR/I	Yes, the project employs well proven N_2O abatement technology from BASF and Continuous Emission Monitoring (CEM) from ABB, conforming to European Norm 14181. The technology would result in better performance in terms of reduction in emission of Green House Gases.		OK
A.3.3. Does the project make provisions for meeting training and maintenance needs?	/1/ /34/	DR/I	Since the project activity is only the introduction of an additional secondary catalyst in the ammonia oxidation reactor and does not change the operating parameters or philosophy, extensive initial training is not envisaged. The training issues are addressed in the CDM Manual.		OK
A.4. Contribution to Sustainable Development *The project's contribution to sustainable development is assessed.*					
A.4.1. Has the host country confirmed that the project	/1/	DR/I	The host country approval confirms that the		OK

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CHECKLIST QUESTION	Ref.	MoV *	COMMENTS	Draft Concl.	Final Concl.
assists it in achieving sustainable development?	/2/		project contributes to sustainable development in India.		
A.4.2. Will the project create other environmental or social benefits than GHG emission reductions?	/1/	DR/I	The project activity is not likely to create any other benefits other than GHG emission reductions.		OK
B. Project Baseline *The validation of the project baseline establishes whether the selected baseline methodology is appropriate and whether the selected baseline represents a likely baseline scenario.*					
B.1. Baseline Methodology *It is assessed whether the project applies an appropriate baseline methodology.*					
B.1.1. Does the project apply an approved methodology and the correct version thereof?	/1/ /4/	DR	The project applies the baseline methodology AM0034 version 03.2, "Catalytic reduction of N_2O inside the ammonia burner of nitric acid plants" The applicable version as per history of the methodology is version 03.2. Necessary revision needs to be made in the PDD.	~~CL 2~~	OK
B.1.2. Are the applicability criteria in the baseline methodology all fulfilled?	/1/ /4/ /14/ /15/ /22/	DR/I	Yes, the project fulfils all the applicability criteria of the methodology. • Secondary N_2O abatement catalyst will be installed inside the ammonia burner below the precious metal gauze pack. • The commercial production in the plant	~~CL 2~~	OK

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	/34/		began before 31 December 2005. (Plant started production in 1968). • Project activity will not affect nitric acid production or increase the level of NO_x emission. • The plant is equipped with Selective Catalytic Reduction (SCR) unit for NO_x reduction • At present there is no regulatory requirement to reduce levels of N_2O emissions from nitric acid plants in India. • The project activity will not lead to additional emissions of greenhouse gases. • Instruments will be installed for continuous real-time measurements of N_2O concentration and total gas volume flow in the stack. However, evidence may be provided to show that the project activity will not affect nitric acid production or will lead to increased NO_x / GHG emissions. Further, it needs to be confirmed that the ammonia oxidizer is not replaced after 31 December 2005. PP also needs to provide the details of the N_2O abatement technology being employed.		
B.2. Baseline Scenario Determination *The choice of the baseline scenario will be validated*					

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with focus on whether the baseline is a likely scenario, and whether the methodology to define the baseline scenario has been followed in a complete and transparent manner.					
B.2.1. What is the baseline scenario?	/1/	DR/I	The baseline scenario for the project activity is the continuation of current practice of N_2O release to atmosphere without installation of secondary catalyst in the nitric acid plant.		OK
B.2.2. What other alternative scenarios have been considered and why is the selected scenario the most likely one?	/1/ /4/ /5/ /18/	DR/I	Approved methodology AM0034 requires alternative scenarios to be identified as per the procedure described in AM0028. **Step 1: Identify technically feasible baseline scenarios to project activity** ***Step 1a: Evaluation of all technically feasible scenarios to handle N_2O emissions:*** a) Status quo: Continuation of current situation, wherein the N_2O is vented to atmosphere. b) Switch to alternative production method not involving ammonia oxidation process. c) Finding alternative use of N_2O such as recycling of N_2O as a feedstock for the plant. and the use of N_2O for an external purpose. d) Installation of Non-Selective Catalytic Reduction (NSCR) DeNOx unit. e) Installation of N2O destruction or abatement technology as a primary,	~~CL 3~~	OK

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			secondary or tertiary measure. f) Implementation of the project without CDM benefits. Implementation of alternative scenarios b), d), e) and f) would require additional investments without any economic gains. Besides, taking up such measures are neither mandated nor have any impact on the plant performance. Therefore the baseline scenario is the continuation of current practice of N_2O release to the atmosphere. PP needs to elaborate on the possibility of recycling of N_2O as a feedstock for the plant or use of N_2O for an external purpose. ***Step 1b: In addition to the baseline scenario alternatives of Step 1a, all possible options that are technically feasible to handle NO_X emissions should be considered***. Continuation of current practice is the most plausible among all the alternatives available to RCF as this requires no investments and there is no mandate for installation of other alternatives. Installation of NSCR DeNOx unit would not be required by RCF as SCR DeNOx unit is already installed in the plant. All the alternatives are in compliance with the legal and regulatory requirements in the country. But only one alternative i.e. continuing with status quo would be the most		

CHECKLIST QUESTION	Ref.	MoV *	COMMENTS	Draft Concl.	Final Concl.
			plausible in the absence of any income from other alternatives.		
B.2.3. Has the baseline scenario been determined according to the methodology?	/1/ /4/ /5/	DR/I	Yes, the baseline scenario has been determined as per ACM0028 version 04.2., as prescribed in ACM0034 Version 3.2.		OK
B.2.4. Has the baseline scenario been determined using conservative assumptions where possible?	/1/ /5/	DR/I	Yes		OK
B.2.5. Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	/1/ /5/	DR/I	Yes, the national and sectoral policies favour reduction in emission of green house gases such as N_2O.		OK
B.2.6. Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced?	/1/ /5/	DR/I	Yes		OK
B.2.7. Have the major risks to the baseline been identified?	/1/ /5/	DR/I	The baseline needs to be re-assessed in case of change in legislation during the crediting period, as required by the methodology.	~~CL 3~~	OK
B.3. Additionality Determination *The assessment of additionality will be validated with focus on whether the project itself is not a likely baseline scenario.*					
B.3.1. Is the project additionality assessed according to the methodology?	/1/ /4/ /6/ /14/	DR/I	Yes. The project's additionality is determined using the *"Tool for the demonstration and assessment of additionality"* version 5, EB39. **Steps 1:** This step is omitted because of the similarity of the step with the baseline	~~CL 4~~	OK

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CHECKLIST QUESTION	Ref.	MoV *	COMMENTS	Draft Concl.	Final Concl.
	/23/		determination**.** The only alternative to the project identified is continuation of the status quo. Project participants have identified following barriers for the proposed project activity: **Steps 2: Investment analysis:** The project will not generate financial benefits other than CDM revenues. Therefore, RCF has chosen *Option I: Simple cost analysis* and deemed appropriate in the opinion of DNV. The project envisages an investment of INR. 19.4 million and thereafter a further INR 6.4 million annually towards the operation and maintenance of new facilities, without any revenues in return for investment made. Therefore, investment in the project activity is otherwise deemed unlikely in the absence of CDM benefits. **Step 3: Barrier Analysis** ***Sub Step 3a: Technological Barriers:*** For implementing the project, RCF need to install monitoring instruments and data acquisition/reporting systems, apart from installation of secondary catalyst in the ammonia oxidizer. Implementation of project activity would also require longer plant stoppage and consequent production loss. In addition, RCF would have to get its people trained to work on new system to ensure that		

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			the modifications do not have any adverse bearing on plant performance. However, in the opinion of DNV, this deemed as not to be a decisive barrier. ***Sub- step 3(b): Show that the identified barriers would not prevent implementation of at least one of the alternatives:*** The technological barrier described above will not prevent the baseline scenario of continuing with the status quo, since no new facilities are added to the existing nitric acid plant. **<u>Step 4: Common Practice analysis</u>** In India, all the nitric acid plants release N_2O to the atmosphere in the absence of any mandate to control such releases. So far none of the plants in India have implemented any N_2O abatement facility. Hence N_2O abatement project is not a common practice in India. PP needs to detail both steps of the common practice analysis in the PDD, as stipulated in the *"Tool for the demonstration and assessment of additionality"*. Following documents shall also be provided for verification: • Board approval for the project		

CHECKLIST QUESTION	Ref.	MoV *	COMMENTS	Draft Concl.	Final Concl.
			• The basis for project cost and annual expenditure towards the project • Duration of shut down of the plant required for project implementation		
B.3.2. Are all assumptions stated in a transparent and conservative manner?	/1/	DR/I	Same as B.3.2	~~CL 4~~	OK
B.3.3. Is sufficient evidence provided to support the relevance of the arguments made?	/1/	DR/I	Same as B.3.2	~~CL 4~~	OK
B.3.4. If the starting date of the project activity is before the date of validation, has sufficient evidence been provided that the incentive from the CDM was seriously considered in the decision to proceed with the project activity?	/1/ /14/	DR/I	The start date of the project activity is to be justified in line with the EB 41 para 67. Proof for serious consideration of CDM benefits while deciding to proceed with the project needs to be provided. Chronology of events of the project activity needs to be provided.	~~CL 5~~	OK
B.4. Calculation of GHG Emission Reductions – Project emissions *It is assessed whether the project emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.*					
B.4.1. Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/ /4/ /29/ /30/	DR/I	The project emissions has been determined as a product of mean stack gas volume flow rate for the project campaign, mean concentration of N_2O in the stack gas for the project campaign and the number of operating hours	~~CL 6~~	OK

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	/31/		in the project campaign Currently the operating range of each parameter stated in the methodology has not been determined, pending completion of operating condition campaigns. Baseline campaign after installation of stack monitoring equipment also needs to be completed. Project emissions needs to be documented according to the approved methodology.		
B.4.2. Have conservative assumptions been used when calculating the project emissions?	/1/ /31/	DR/I	The emission reductions were estimated without completing the baseline campaign. PP needs to justify the NCSG and VSG values used for estimation of CERs.	~~CAR 2~~	OK
B.4.3. Are uncertainties in the project emission estimates properly addressed?	/1/ /31/	DR/I	Refer to B.4.2	~~CAR 2~~	OK
B.5. Calculation of GHG Emission Reductions – Baseline emissions *It is assessed whether the baseline emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.*					
B.5.1. Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/ /4/ /31/	DR/I	The data collected during the operating condition campaign and baseline campaign along with the statistical analysis shall be provided for verification. Design limits of operating range of oxidation	~~CL 7~~	OK

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			temp., oxidation pressure, ammonia gas flow to reactor, air flow to reactor and ammonia to air ratio needs to be provided. Evidence to be provided for UNC of the instrument. Unit for gas flows shall be nm^3 as per the latest version of methodology.		
B.5.2. Have conservative assumptions been used when calculating the baseline emissions?	/1/ /4/ /31/	DR/I	Refer B.5.1	~~CL 7~~	OK
B.5.3. Are uncertainties in the baseline emission estimates properly addressed?	/1/ /31/	DR/I	Refer B.5.1	~~CL 7~~	OK
B.6. Calculation of GHG Emission Reductions – Leakage *It is assessed whether leakage emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.*					
B.6.1. Are the leakage calculations documented according to the approved methodology and in a complete and transparent manner?	/1/ /4/	DR/I	Leakage is not applicable under the methodology AM0034.version 03.2		OK
B.7. Emission Reductions *The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.*					
B.7.1. Are the emission reductions real, measurable and	/1/	DR/I	In the revised PDD, the annual emission	~~CAR 1~~	OK

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give long-term benefits related to the mitigation of climate change.	/4/		reductions are much higher than the CERs stated in the PDD web hosted. The reasons for the increase need to be explained.	~~CL 6~~ ~~CL 7~~	
B.8. Monitoring Methodology *It is assessed whether the project applies an appropriate monitoring methodology.*					
B.8.1. Is the monitoring plan documented according to the approved methodology and in a complete and transparent manner?	/1/ /4/ /22/ /24/	DR/I	Yes. Monitoring plan is documented in accordance with the approved methodology. However, details of the monitoring equipment such as type of instrument, measurement accuracy, calibration and maintenance procedure, compliance of stack monitoring equipment to EN14181 etc. needs to be provided. Responsibility for monitoring, reporting & checking of data needs to be stated in the monitoring plan. The source of data for nitric acid production shall be clearly stated in the PDD.	~~CL 8~~	OK
B.8.2. Will all monitored data required for verification and issuance be kept for two years after the end of the crediting period or the last issuance of CERs, for this project activity, whichever occurs later?	/1/ /4/	DR/I	In accordance with AM0034, all monitored data will be electronically archived and kept for two years after the end of the crediting period for the project		OK
B.9. Monitoring of Project Emissions *It is established whether the monitoring plan provides for reliable and complete project emission*					

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CHECKLIST QUESTION	Ref.	MoV *	COMMENTS	Draft Concl.	Final Concl.
data over time.					
B.9.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for estimation or measuring the greenhouse gas emissions within the project boundary during the crediting period?	/1/ /4/ /22/	DR/I	Yes. The monitoring plan provides for the collection of all the data required for PE calculations, as per methodology AM0034 version 03.2. This include the monitoring of AFR, AIFR as well as pressure and temperature inside the ammonia oxidiser, production of nitric acid, operating hours, temperature, pressure, gas flow rate, N_2O concentration in the stack gas and gauze composition and supplier.		OK
B.9.2. Are the choices of project GHG indicators reasonable and conservative?	/1/ /4/	DR/I	Yes. N_2O is the GHG indicator that needs to be accounted for and all the parameters required to account for this have been included in the monitoring plan		OK
B.9.3. Is the measurement method clearly stated for each GHG value to be monitored and deemed appropriate?	/1/ /4/	DR/I	Yes		OK
B.9.4. Is the measurement equipment described and deemed appropriate?	/1/ /4/	DR/I	Refer B.8.1	~~CL 8~~	OK
B.9.5. Is the measurement accuracy addressed and deemed appropriate? Are procedures in place on how to deal with erroneous measurements?	/1/ /4/ /22/	DR/I	Refer B.8.1	~~CL 8~~	OK
B.9.6. Is the measurement *interval* identified and deemed appropriate?	/1/ /4/	DR/I	Yes, the measurement interval is specified in the MP for each parameter.		OK

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CHECKLIST QUESTION	Ref.	MoV *	COMMENTS	Draft Concl.	Final Concl.
B.9.7. Is the *registration, monitoring, measurement* and *reporting* procedure defined?	/1/ /4/	DR/I	Refer B.8.1	~~CL 8~~	OK
B.9.8. Are procedures identified for *maintenance* of monitoring equipment and installations? Are the calibration intervals being observed?	/1/ /4/	DR/I	Refer B.8.1	~~CL 8~~	OK
B.9.9. Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)	/1/ /4/ /22	DR/I	Refer B.8.1	~~CL 8~~	OK
B.10. Monitoring of Baseline Emissions *It is established whether the monitoring plan provides for reliable and complete baseline emission data over time.*					
B.10.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining baseline emissions during the crediting period?	/1/ /4/	DR/I	Yes, the monitoring plan envisages measurement of all relevant data necessary for determining the baseline emissions during the crediting period. The baseline emission factor (t N_2O/ t HNO_3) is to be arrived from the parameters monitored during the baseline campaign, the GWP of N_2O, the operating hours of the campaign and the nitric acid produced.		OK
B.10.2. Are the choices of baseline GHG indicators reasonable and conservative?	/1/ /4/	DR/I	Yes. N_2O is the GHG indicator that needs to be accounted for and all the parameters required to account for this have been included in the monitoring plan.		OK

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B.10.3. Is the measurement method clearly stated for each baseline indicator to be monitored and also deemed appropriate?	/1/ /4/	DR/I	Yes		OK
B.10.4. Is the measurement *equipment* described and deemed appropriate?	/1/ /4/	DR/I	Refer B.8.1	~~CL 8~~	OK
B.10.5. Is the measurement *accuracy* addressed and deemed appropriate? Are procedures in place on how to deal with erroneous measurements?	/1/ /4/	DR/I	Refer B.8.1	~~CL 8~~	OK
B.10.6. Is the measurement *interval* for baseline data identified and deemed appropriate?	/1/ /4/	DR/I	Yes, the measurement interval is specified in the MP for each parameter.		OK
B.10.7. Is the registration, *monitoring, measurement* and *reporting* procedure defined?	/1/ /4/	DR/I	Refer B.8.1	~~CL 8~~	OK
B.10.8. Are procedures identified for *maintenance* of monitoring equipment and installations? Are the calibration intervals being observed?	/1/ /4/ /22/	DR/I	Refer B.8.1	~~CL 8~~	OK
B.10.9. Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)	/1/ /4/ /22/	DR/I	Refer B.8.1	~~CL 8~~	OK
B.11. Monitoring of Leakage *It is assessed whether the monitoring plan provides for reliable and complete leakage data over time.*					

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B.11.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining leakage?	/1/ /4/	DR/I	No leakage is applicable under this methodology.		OK
B.12. Monitoring of Sustainable Development Indicators/ Environmental Impacts *It is assessed whether choices of indicators are reasonable and complete to monitor sustainable performance over time.*					
B.12.1. Is the monitoring of sustainable development indicators/ environmental impacts warranted by legislation in the host country?	/1/	DR/I	Host country does not call for monitoring the sustainable development indicators.		OK
B.12.2. Does the monitoring plan provide for the collection and archiving of relevant data concerning environmental, social and economic impacts?	/1/	DR/I	This is not required as per the legislation and hence not applicable.		OK
B.12.3. Are the sustainable development indicators in line with stated national priorities in the Host Country?	/1/	DR/I	Refer to B.12.1		OK
B.13. Project Management Planning *It is checked that project implementation is properly prepared for and that critical arrangements are addressed.*					
B.13.1. Is the authority and responsibility of overall project management clearly described?	/1/ /22/	DR/I	Authority and responsibility of overall project management, with specific responsibility for data monitoring & record	~~CL 9~~	OK

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			keeping system needs to be addressed in the monitoring plan. Training and emergency handling needs to be addressed in the PDD. Procedure for maintenance and calibration of equipment to be addressed in PDD. Procedures for review of data and corrective actions need to be provided in the PDD.		
B.13.2. Are procedures identified for training of monitoring personnel?	/1/ /22/	DR/I	Refer B.13.1	~~CL 9~~	OK
B.13.3. Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?	/1/ /22/	DR/I	Refer B.13.1	~~CL 9~~	OK
B.13.4. Are procedures identified for review of reported results/data?	/1/ /22/	DR/I	Refer B.13.1	~~CL 9~~	OK
B.13.5. Are procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting?	/1/ /22/	DR/I	Refer B.13.1	~~CL 9~~	OK
C. Duration of the Project/ Crediting Period *It is assessed whether the temporary boundaries of the project are clearly defined.*					
C.1.1. Are the project's starting date and operational lifetime clearly defined and evidenced?	/1/ /14/	DR/I	The project start date is 14 March 2008 and the operational lifetime has been estimated to be 20 years.	~~CL 10~~	OK

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			This operational lifetime of the project needs to be substantiated. Also, the start date of the project activity is to be justified in line with the EB 41 para 67.		
C.1.2. Is the start of the crediting period clearly defined and reasonable?	/1/	DR/I	The start of the crediting period is defined from 01 October 2009 or the date of registration whichever is later. It needs to be revised as the date of registration or eight weeks from the date of submission of the project to the EB for registration.	~~CL 10~~	OK
D. Environmental Impacts *Documentation on the analysis of the environmental impacts will be assessed, and if deemed significant, an EIA should be provided to the validator.*					
D.1.1. Has an analysis of the environmental impacts of the project activity been sufficiently described?	/1/ /7/	DR/I	It has been verified that the project does not require an EIA (Ref - Latest EIA Notification 2006). However, clearance for the project from State Pollution Control Board needs to be provided.	~~CL 11~~	OK
D.1.2. Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved?	/1/ /7/	DR	Not Applicable		OK
D.1.3. Will the project create any adverse environmental effects?	/1/	DR	The project is not likely to create any adverse environmental effects.		OK

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D.1.4. Are transboundary environmental impacts considered in the analysis?	/1/	DR	The project is unlikely to cause any transboundary environmental impacts.		OK
D.1.5. Have identified environmental impacts been addressed in the project design?	/1/	DR	No negative impacts have been identified for the project.		OK
D.1.6. Does the project comply with environmental legislation in the host country?	/1/	DR	Refer D.1.1	~~CL 11~~	OK
E. Stakeholder Comments *The validator should ensure that stakeholder comments have been invited with appropriate media and that due account has been taken of any comments received.*					
E.1.1. Have relevant stakeholders been consulted?	/1/ /18/ /19/ /20/ /21/	DR/I	RCF had published advertisements in local newspapers *Navshakti* (Marathi Daily) and *Free Press Journal* (English Daily) on the project activity. The comments were invited through mail/ email/ phone/ fax. In response to the advertisement, RCF received two letters, one from a local resident and other from General Secretary– RCF Employees Union. Both appreciated RCF's efforts in reducing the emission of GHG gases. RCF conducted a local meeting with employees on 12 March 2008 to apprise them of the project activity and its impact on environmental. Comments made by the participants were positive and they generally	~~CL 12~~	OK

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			supported the establishment. Copies of press advertisements, letters received from stakeholders and the minutes of meeting needs to be provided for verification.		
E.1.2. Have appropriate media been used to invite comments by local stakeholders?	/1/ /35/	DR/I	Refer E.1.1 Copies of communication used for inviting stakeholders to the meeting needs to be provided.	~~CL 12~~	OK
E.1.3. If a stakeholder consultation process is required by regulations/laws in the host country, has the stakeholder consultation process been carried out in accordance with such regulations/laws?	/1/	DR/I	Refer E.1.1	~~CL 12~~	OK
E.1.4. Is a summary of the stakeholder comments received provided?	/1/ /20/	DR/I	Refer E.1.1	~~CL 12~~	OK
E.1.5. Has due account been taken of any stakeholder comments received?	/1/	DR/I	Refer E.1.1	~~CL 12~~	OK

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Table 2b: Additional requirements checklist for VVM version 1 (EB 44)

CHECKLIST QUESTION	Ref.	MoV *	COMMENTS	Draft Concl.	Final Concl.
A.5. Letter of approval					
A.5.1 Is the LoA received directly from the DNA or through the project participant.	/1/ /2/	DR/I	The LoA was received through the project participant.		OK
A.6. Project design					
A.6.1 Does the PDD describe the CDM project activity with all relevant elements in a transparent and accurate way?	/1/	DR/I	Yes, the PDD describes the CDM project activity with all relevant elements in a transparent and accurate way.		OK
A.6.2 Has the CDM project activity at the start of the validation been constructed or does the CDM project activity use existing facilities or equipment?	/1/	DR/I	The CDM project activity (N_2O abatement) has been constructed at the start of the validation. Existing equipment of the nitric acid plant will continue to be used for the post project scenario also.		OK
A.6.3 Is the project a large scale project, a small scale project with average annual emission reductions above 15 000 tonnes or a bundled small scale project? Has on-site visit been carried out?	/1/	DR	This is a large scale project, with estimated annual emission reductions of 447 305 tonnes CO_2e. The on-site visit was carried out by the GHG auditor and validator of DNV.		OK
A.6.4 Does the project activity involve alteration of existing installations? If so, have the differences between pre-project and post-project activity been clearly described in the PDD?	/1/	DR	No. The project activity involves installation of secondary catalyst in the AOR and stack monitoring equipment as per EN 14181. The differences between pre-project and post-project activity been clearly described in the PDD		OK

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CHECKLIST QUESTION	Ref.	MoV *	COMMENTS	Draft Concl.	Final Concl.
A.7. Project emissions not addressed by the methodology					
A.7.1 Does the methodology describe all project emission source for the project activity that contributes all 1% of the emission reductions? Sources that the methodology considers not to take into account are not relevant (e.g. cement and iron consumption for building hydropower plants).	/1/ /4/	DR	Yes. The methodology sufficiently describes all project emission sources for the project activity that contributes to more than 1% of the emission reductions. Sources that the methodology considers not to take into account are not relevant		OK
A.8. Documentation of baseline emissions					
A.8.1 Documentation of the baseline determination: a. All assumptions and data used by the project participants are listed in the PDD and related document to be submitted for registration. The data are properly referenced. b. All documentation is relevant as well as correctly quoted and interpreted. c. Assumptions and data can be deemed reasonable d. Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD. e. The methodology has been correctly applied to identify what would occurred in the absence of the proposed CDM project activity	/1/ /5/ /4/	DR	Yes. All assumptions and data used by the project participants are listed in the PDD and related document to be submitted for registration. The data are properly referenced. Yes. All documentation is relevant as well as correctly quoted and interpreted. Yes. Assumptions and data can be deemed reasonable Yes. Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD. Yes. The methodology has been correctly applied to identify what would have occurred in the absence of the proposed CDM project activity		OK
A.9. Documentation of the calculations					
A.9.1 Algorithms and/or formulae used to determine emission reductions	/1/ /4/	DR/I	Yes. All assumptions and data used by the project participants are listed in the PDD and		OK

* MoV = Means of Verification, DR= Document Review, I= Interview

CHECKLIST QUESTION	Ref.	MoV *	COMMENTS	Draft Concl.	Final Concl.
• All assumptions and data used by the project participants are listed in the PDD and related document submitted for registration. The data are properly referenced • All documentation is correctly quoted and interpreted. • All values used can be deemed reasonable in the context of the project activity • The methodology has been correctly applied to calculate the emission reductions and this can be replicated by the data provided in the PDD and supporting files to be submitted for registration.	/31/		related document submitted for registration. The data are properly referenced Yes. All documentation is correctly quoted and interpreted. Yes. All values used can be deemed reasonable in the context of the project activity Yes. The methodology has been correctly applied to calculate the emission reductions and this can be replicated by the data provided in the PDD and supporting files to be submitted for registration.		
A.10. Implementation of the monitoring plan					
A.10.1 How were the plans for implementation of the monitoring plan, data management, QA/QC procedures assessed? To what extent can the emission reductions achieved by the project by monitored ex-post and verified later by a DOE?	/1/ /22/	DR/I	The project participant has prepared a comprehensive CDM manual, covering all aspects of QA/QC issues of the project. The projected emission reductions are expected to be achieved depending on the actual N_2O destruction and nitric acid production.		Yes
A.11. CDM consideration prior to starting date					
A.11.1 The prior consideration of CDM for the project activity complies with EB41 annex 46	/1/ /14/	DR	The prior consideration of CDM in the project is demonstrated through the minutes of the Board meeting, which is prior to the start date of the project. The parallel action to secure CDM revenues is demonstrated by chronology of events, described in section B.5 of the PDD. This is in compliance with		Yes

* MoV = Means of Verification, DR= Document Review, I= Interview

CHECKLIST QUESTION	Ref.	MoV *	COMMENTS	Draft Concl.	Final Concl.
			EB 41 annex 46 guidelines.		

Table 3 Resolution of Corrective Action and Clarification Requests

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
CAR 1 The emission reductions were estimated without completing the baseline campaign. PP needs to justify the NCSG and VSG values used for estimation of CERs. PP has applied temperature and pressure corrections to the stack gas flow recorded by the CEM, resulting in some of the NCSG values exceeding the range of the instrument.	B.7.1	At the time of formatting the PDD, there was no data available on the N_2O emissions from the stack gas from nitric acid plant. Hence PP had assumed N_2O emission values for estimation of emission reductions. PP installed the monitoring system to measure N_2O emissions from the stack as part of the proposed project activity. When the actual baseline tests were conducted, N_2O emissions in the stack gas came different from the assumed one and hence PP revised the figures of N_2O emissions that also got reflected in the emission reduction calculations. It may be noted that the values based on actual onsite monitoring is as per the approved methodology AM00034. The monitored data is available for validation. PP corrected the baseline calculations by removing the temperature and pressure corrections to NCSG.	OK. The N_2O concentration in stack gas used for CER estimation at the time of initial PDD preparation was 7.338 kg/t HNO_3, whereas the actual value during baseline campaign was 12.5 kg/t HNO_3 /31/ The emission reductions have increased consequentially. In the updated baseline calculations, PP has directly used the NCSG values from CEM. The CAR 1 is closed.
CAR 2 The capacity of the plant as per operating manual is 352 MT/day as 100% nitric acid, whereas in PDD, it stated as 387 MT/day. PP	B.4.2 B.4.3	RCF has already submitted last five year production data, which confirms that the design capacity of the plant is not exceeded. We have also submitted a	OK. In the updated PDD, PP has corrected design capacity of the plant in line with the methodology. The plant capacity

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
is requested to substantiate the higher capacity of the plant.		letter from experts in the field of Nitric acid plant design (M/s UDHE), stating that the plant can operate at 110% capacity when the catalyst is new and under favourable climatic conditions. PP does not have any further documents to substantiate the higher design capacity. Hence PP accepts that the name plate capacity of the plant is 128480 MT (352 X 365) per annum.	stated in the operating manual is 352 MT per day as 100% HNO_3. CAR 2 is closed.
CL 1 ▪ Equipment specification/ P.O. to be provided for verification. ▪ Evidence for compliance to EN14181, QAL certification and other relevant standards to be provided for the monitoring equipment. ▪ PP is also required to provide proof to confirm the methodological requirements of parameters VSG and NCSG are measured every 2 seconds and that the instruments provide the average of the measured values of the previous 60 minutes for recording. ▪ The calibration frequency of acid flow meter stated is 5 years. This may be substantiated with supporting documents.	A.3.1 A.3.3	The secondary catalyst is purchased from M/s BASF and monitoring system from ABB. Purchase orders issued to M/s BASF and ABB are available for validation. ABB's QAL 1 certificate and QAL 2 certificate from TUV-SUD for compliance of the monitoring system to AM0034 and EN14181 are available for validation The email from TUV-SUD Gmbh dated 20 April 2009 states that scan rate of data is 1 second, better than the methodological requirement of 2 seconds. The frequency of calibration of product	OK. The Purchase orders for catalyst and monitoring system were provided for verification. QAL 1 and QAL 2 certificates of the monitoring system were also made available to DNV./25/, /26/. The email of TUV /37/ confirms that the monitoring frequency of stack parameters is 2 seconds or better. The letter from supplier (Emerson) of mass flow meters recommended a calibration frequency of 3 years /38/. CL 1 is closed.

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		acid flow meter is set at once in 3 years as per OEM recommendation. ISO procedure will be revised.	
CL 2 The applicable version as per history of the methodology is version 3.2. Necessary revision needs to be made in the PDD. Evidence may be provided to show that the project activity will not affect nitric acid production or will lead to increased NO_x or GHG emissions. Further, it needs to be confirmed that the ammonia oxidizer is not replaced after 31 December 2005. PP also needs to provide the details of the N_2O abatement technology being employed.	B.1.1 B.1.2	Version number of the methodology is updated in the revised PDD to 3.1. In the agreement between RCF and BASF it is stated that the secondary catalyst installation will not affect nitric acid production. Copy of the document is available for validation. The project activity is installation of a secondary catalyst, replacing raschig ring and does not lead to any additional GHG emissions compared to baseline. PP confirms that the ammonia oxidiser has not been replaced after December 2005. Evidence for the same has been evidenced by: 1) Production bulletins dated 1st April 2005, 2006, 2007 and 2008, which lists the modifications carried out in each plant during the previous accounting year. Installation of a secondary catalyst in the AOR is the technology employed by RCF. This catalyst converts N_2O to N_2	OK. The latest version of PDD shows the correct version of the methodology. The response of RCF and the supporting documents confirms that the project activity will not affect nitric acid production lead to increased NO_x or GHG emissions. The documents provided to DNV do not indicate replacement of AOR after 31 December 2005. The details of the N_2O abatement technology being employed in the project activity are provided. The CL 2 is closed.

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		and O_2 $2N2O \leftrightarrow 2N_2 + O_2$ The same is explained in section A.4.3 of the revised PDD.	
CL 3 ▪ PP needs to elaborate on the possibility of recycling of N_2O as a feedstock for the plant or use of N_2O for an external purpose. ▪ The baseline needs to be re-assessed in case of change in legislation during the crediting, as required by the methodology. This has not been brought about in PDD. Further, steps 5a and 5b of the baseline determination according to AM0028 have not been described	B.2.2 B.2.7	N_2O does not have any use in the plant.. RCF is not aware of any use of N_2O for external purpose. Further, N_2O separation from tail gas of the Nitric Acid plant stack, where it is present only at low concentrations, is techno-economically not feasible The revised PDD explains both the steps (5a and 5b) of the baseline determination. In case of a change in legislation regarding N_2O emission during the crediting period, the Baseline will be readjusted, from the date of its implementation	OK. PP's explanation of not using N_2O elsewhere is reasonable steps 5a and 5b of the baseline determination according to AM0028 have been described correctly. CL 3 is closed
CL 4 PP needs to detail both steps of the common practice analysis in the PDD, as stipulated in the "*Tool for the demonstration and assessment of additionality*". Following documents shall also be provided for verification: • Board approval for the project • The basis for project cost and annual	Table 1 B.3.1 B.3.2 B.3.3	Both steps of common practice are now part of revised PDD. Board approved the project on 25/07/2007. Copy of the same is available for validation. Project cost and the annual expenditure towards the project are based on various Purchase Orders raised and consolidated cost sheet is provided for DOE for	OK. Revised PDD describes both steps of the common practice analysis. The copies of Board note, cost sheet and duration of shut down for catalyst installation were provided to DNV. CL 4 is closed

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
expenditure towards the project Duration of shut down of the plant required for project implementation		verification. Duration of shutdown for catalyst installation shall be maximum 72 Hrs.	
CL 5 The start date of the project activity is to be justified in line with the EB 41 para 67. Proof for serious consideration of CDM benefits while deciding to proceed with the project needs to be provided. Chronology of events of the project activity needs to be provided.	B.3.4	The start date of the project activity is revised to the date of PO raised on ABB. This is first step from RCF for financially committing to the project and is justified as per EB41 para 67. RCF has considered CDM benefits during the decision making process. Board note dated 25/07/2007 clearly states the same. Copy of the same is available for validation. Detailed chronology of the project activity is provided in section B.5 of revised PDD.	OK. The start date is revised to 14 March 2008, the date on which first financial commitment towards the project was made. The date is in accordance with EB41 para 67. The Board note and the chronology of events provided by the project participant evidences the CDM in the decision making and efforts to secure CDM status in parallel with the physical implementation of the project. CL 5 is closed
CL 6 Project emissions needs to be documented according to the approved methodology.	B.4.1 B.4.2 B.4.3 B.7.1	An excel sheet for emission reduction calculations, which details the project emissions is provided to DOE for verification.	OK. Spread sheet for project is provided to DNV /31/. CL 6 is closed
CL 7 The data collected during the Operating condition campaign and Baseline campaign along with the statistical analysis needs to be	B.5.1 B.5.2 B.5.3 B.7.1	Excel sheets with data pertaining operating condition campaign and baseline campaigns were provided for DOE for verification.	OK. Spread sheet for determination of operating parameters /29/, baseline emissions /30/, emission reduction calculations /31/ and QAL 2 certificate

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
provided for validation. Design limits of operating range of oxidation temp., oxidation pressure, ammonia gas flow to reactor, air flow to reactor and ammonia to air ratio needs to be provided. Evidence to be provided for UNC of the instrument. Unit for gas flows shall be nm^3 as per the latest version of methodology.		Design data for the parameters were also provided for validation. QAL2 certificate that contains UNC value in accordance with EN14181 standards is certified by TUV-SUD. The value of UNC is 4.52%. Copy of the same is provided for verification. Unit of gas flow is revised as Nm^3 in revised PDD.	detailing the UNC /26/ were provided for verification. The details of the same are also explained in the revised PDD. The unit of stack gas flow is revised to Nm^3 in the PDD in accordance to the methodology. CL 7 is closed
CL 8 Details of the monitoring equipment such as type of instrument, measurement accuracy, calibration and maintenance procedure, compliance of stack monitoring equipment to EN14181 etc. needs to be provided. Responsibility for monitoring, reporting & checking of data needs to be stated in the monitoring plan. The source of data for nitric acid production shall be clearly stated in the PDD.	B.8.1 B.9.4 B.9.5 B.9.7 B.9.8 B.9.9 B.10.4 B.10.5 B.10.7 B.10.8 B.10.9	Details of monitoring equipments like type, measurement accuracy and calibration schedule is a part of ISO9001. Copy of the schedule for ISO is provided for DOE. PO for stack monitoring system and QAL 2 certificate issued by TUV-Sud Germany conforms that the ABB supplied monitoring instrument complies with EN14181. Copy of the same is provided to DOE. Responsibilities pertaining to monitoring, reporting and checking of data is briefed in CDM Manual. Copy of the same is provided to DOE for verification. Source of data for Nitric acid production has been clearly stated in the	OK. Quality systems procedures of RCF /24/ take care of the maintenance and calibration requirements of monitoring instruments. QAL 2 certification /26/ of CEM confirms the compliance of EN 14181. CDM manual /22/ sufficiently addresses the monitoring responsibilities. The reporting procedure for acid production is detailed in the revised PDD. CL 8 is closed.

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		PDD.	
CL 9 • Authority and responsibility of overall project management with specific responsibility for data monitoring & record keeping system needs to be addressed in the monitoring plan. • Training and emergency handling needs to be addressed in the PDD • Procedure for maintenance and calibration of equipment to be addressed in PDD. • Emergency Preparedness Plan to be provided for verification. • Procedures for review of data and corrective actions need to be provided in the PDD.	B.13.1 B.13.2 B.13.3 B.13.4 B.13.5	Authority and responsibility of overall project management with specific responsibility for data monitoring & record keeping system and procedure for review and corrective action of data are addressed in CDM Manual. Also the CDM manual contains procedures for emergency handling for monitoring of data required as part of project activity. Copy of the same is provided for DOE.	OK. CDM manual /22/ sufficiently addresses the authority and responsibilities for project management and record keeping, procedure for training and emergency handling. CL 9 is closed
CL 10 • The operational lifetime of the project has been estimated to be 21 years, which needs to be substantiated. • The start of the crediting period needs to be revised as the date of registration or four weeks from the date of submission of the project to the EB for registration.	C.1.1 C.1.2	RCF is installing secondary catalyst in the project activity and would continue to do so till the CER income is made available to it. As the crediting period is envisaged as 21 years, RCF would continue to install the secondary catalyst for as many years at least. The start date of the crediting period is	OK. The justification given for the operational life of the project is reasonable The start date of the crediting period is revised in the PDD. CL 10 is closed.

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		same as the date of registration or the date of installation of secondary catalyst, whichever is later. The same is included in the section C.2.2.1 of the revised PDD.	
CL 11 • Clearance for the project from State Pollution Control Board needs to be provided.	D.1.1 D.1.4 D.1.6	RCF has obtained consent from Maharastra Pollution Control Board for the entire facility that includes the project activity. Copy of the same is available for validation. A Letter informing PCB about implementation of this project has been submitted to them, copy of the letter is provided to validation team.	OK. Copy of the letter to PCB /36/, regarding implementation of the CDM project was provided for verification of DNV. CL 11 is closed.
CL 12 • Copies press advertisements, letters received from stakeholders and the minutes of meeting needs to be provided for verification. • Copies of communication used for inviting stakeholders to the meeting needs to be provided.	E.1.1 E.1.2 E.1.3 E.1.4 E.1.5	Stake holders were identified and invited through news paper advertisement. Copy of the same is provided to DOE. Letter containing two responses are also provided to DOE. Moreover RCF's also carried out local stakeholder meeting on 12th March 2008. MOM and Photographs of the meeting are available for Validation.	OK. Copies of newspaper advertisement /18/, response received /19/, invitation letter /35/ minutes of meeting and photographs /20 on stakeholder consultation were provided to DNV for verification. CL 12 is closed.

APPENDIX B

CERTIFICATES OF COMPETENCE

CERTIFICATE OF COMPETENCE

Kumaraswamy Chandrashekara

Qualification in accordance with DNV's Qualification Scheme CDM/JI (ICP-9-8-i1-CDMJI-i1

GHG Auditor:	yes

Technical Area		***CDM Validator***	***CDM Verifier***	***Sector Expert***	***Methodology Expert***	***Technical Reviewer***
Landfill gas		Jan 2009	Jan 2009		Jan 2009	Jan 2009
Renewables	*Hydro power*	Jan 2009	Jan 2009		Jan 2009	Jan 2009
	Wind power	Jan 2009	Jan 2009			
	Other renewable	Jan 2009	Jan 2009			
Biomass		Jan 2009	Jan 2009		Jan 2009	Jan 2009
Grid connection of isolated system		Jan 2009	Jan 2009		Jan 2009	Jan 2009
Cement		Jan 2009	Jan 2009		Jan 2009	Jan 2009
Waste-heat / waste-gas recovery		Jan 2009	Jan 2009	Jan 2009	Jan 2009	Jan 2009
Efficiency of thermal power plants		Jan 2009	Jan 2009		Jan 2009	Jan 2009
Coal mine methane		Jan 2009	Jan 2009		Jan 2009	Jan 2009
Fuel switch		Jan 2009	Jan 2009		Jan 2009	Jan 2009
Manure management		Jan 2009	Jan 2009		Jan 2009	Jan 2009
Waste / wastewater treatment		Jan 2009	Jan 2009		Jan 2009	Jan 2009
Energy efficiency		Jan 2009	Jan 2009	Jan 2009	Jan 2009	Jan 2009
N_2O		Jan 2009	Jan 2009		Jan 2009	Jan 2009
HFCs		Jan 2009	Jan 2009	Jan 2009	Jan 2009	Jan 2009
Flare reduction		Jan 2009	Jan 2009		Jan 2009	Jan 2009
PFCs		Jan 2009	Jan 2009		Jan 2009	Jan 2009
Charcoal		Jan 2009	Jan 2009	Jan 2009	Jan 2009	Jan 2009
CO_2 recovery		Jan 2009	Jan 2009	Jan 2009	Jan 2009	Jan 2009
Transport		Jan 2009	Jan 2009		Jan 2009	Jan 2009
Non-renewable biomass		Jan 2009	Jan 2009		Jan 2009	Jan 2009
Biofuel		Jan 2009	Jan 2009		Jan 2009	Jan 2009
Pipeline leakage reduction		Jan 2009	Jan 2009		Jan 2009	Jan 2009
SF_6		Jan 2009	Jan 2009		Jan 2009	Jan 2009

Høvik, 9 January 2009

Michael Lehmann

Michael Lehmann
Technical Director, Climate Change Services

CERTIFICATE OF COMPETENCE

Ravi Kumar Prabhu

Qualification in accordance with DNV's Qualification Scheme CDM/JI (ICP-9-8-i1-CDMJI-i1

GHG Auditor:		Yes				
Technical Area		***CDM Validator***	***CDM Verifier***	***Sector Expert***	***Methodology Expert***	***Technical Reviewer***
Landfill gas						
Renewables	*Hydro power*					
	Wind power					
	Other renewable					
Biomass						
Grid connection of isolated system						
Cement						
Waste-heat / waste-gas recovery						
Efficiency of thermal power plants						
Coal mine methane						
Fuel switch						
Manure management						
Waste / wastewater treatment						
Energy efficiency						
N_2O						
HFCs						
Flare reduction						
PFCs						
Charcoal						
CO_2 recovery						
Transport						
Non-renewable biomass						
Biofuel						
Pipeline leakage reduction						
SF_6						

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CERTIFICATE OF COMPETENCE

Ramesh Ramachandran

Qualification in accordance with DNV's Qualification Scheme CDM/JI (ICP-9-8-i1-CDMJI-i1

GHG Auditor:		Yes				
Technical Area		***CDM Validator***	***CDM Verifier***	***Sector Expert***	***Methodology Expert***	***Technical Reviewer***
Landfill gas		Jan 2009	Jan 2009	Jan 2009		
Renewables	*Hydro power*	Jan 2009	Jan 2009		Jan 2009	Jan 2009
	Wind power	Jan 2009	Jan 2009			
	Other renewable	Jan 2009	Jan 2009			
Biomass		Jan 2009	Jan 2009			
Grid connection of isolated system		Jan 2009	Jan 2009			
Cement		Jan 2009	Jan 2009			
Waste-heat / waste-gas recovery		Jan 2009	Jan 2009			
Efficiency of thermal power plants		Jan 2009	Jan 2009			
Coal mine methane		Jan 2009	Jan 2009			
Fuel switch		Jan 2009	Jan 2009			
Manure management		Jan 2009	Jan 2009			
Waste / wastewater treatment		Jan 2009	Jan 2009	Jan 2009		
Energy efficiency		Jan 2009	Jan 2009			
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Charcoal		Jan 2009	Jan 2009			
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Transport		Jan 2009	Jan 2009			
Non-renewable biomass		Jan 2009	Jan 2009			
Biofuel		Jan 2009	Jan 2009			
Pipeline leakage reduction		Jan 2009	Jan 2009			
SF_6		Jan 2009	Jan 2009			

Høvik, 9 January 2009

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CERTIFICATE OF COMPETENCE

Raman Venkata Kakaraparthi

Qualification in accordance with DNV's Qualification Scheme CDM/JI (ICP-9-8-i1-CDMJI-i1

GHG Auditor:		Yes				
Technical Area		***CDM Validator***	***CDM Verifier***	***Sector Expert***	***Methodology Expert***	***Technical Reviewer***
Landfill gas		Jan 2009				
Renewables	*Hydro power*	Jan 2009			Jan 2009	Jan 2009
	Wind power	Jan 2009	Jan 2009			
	Other renewable					
Biomass		Jan 2009				
Grid connection of isolated system						
Cement						
Waste-heat / waste-gas recovery		Jan 2009	Jan 2009	Jan 2009		
Efficiency of thermal power plants				Jan 2009		
Coal mine methane						
Fuel switch				Jan 2009		
Manure management						
Waste / wastewater treatment		Jan 2009				
Energy efficiency		Jan 2009	Jan 2009	Jan 2009		
N_2O						
HFCs		Jan 2009	Jan 2009			
Flare reduction						
PFCs						
Charcoal						
CO_2 recovery				Jan 2009		
Transport						
Non-renewable biomass						
Biofuel						
Pipeline leakage reduction						
SF_6						

Høvik, 9 January 2009

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CERTIFICATE OF COMPETENCE

Trine Kopperud

Qualification in accordance with DNV's Qualification Scheme CDM/JI (ICP-9-8-i1-CDMJI-i1

GHG Auditor:		Yes				
Technical Area		***CDM Validator***	***CDM Verifier***	***Sector Expert***	***Methodology Expert***	***Technical Reviewer***
Landfill gas						
Renewables	*Hydro power*					
	Wind power					
	Other renewable					
Biomass						
Grid connection of isolated system						
Cement						
Waste-heat / waste-gas recovery						
Efficiency of thermal power plants						
Coal mine methane						
Fuel switch						
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Energy efficiency				Jan 2009		
N_2O		Jan 2009	Jan 2009	Jan 2009	Jan 2009	Jan 2009
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PFCs						
Charcoal						
CO_2 recovery				Jan 2009		
Transport						
Non-renewable biomass						
Biofuel						
Pipeline leakage reduction						
SF_6						

Høvik, 9 January 2009

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CERTIFICATE OF COMPETENCE

Michael Lehmann

Qualification in accordance with DNV's Qualification Scheme CDM/JI (ICP-8-1-CDMJI-i1)

GHG Auditor:		Yes				
Technical Area		***CDM Validator***	***CDM Verifier***	***Sector Expert***	***Methodology Expert***	***Technical Reviewer***
Landfill gas		Jan 2009	Jan 2009		Jan 2009	Jan 2009
Renewables	*Hydro power*	Jan 2009	Jan 2009	Jan 2009	Jan 2009	Jan 2009
	Wind power	Jan 2009	Jan 2009			
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Pipeline leakage reduction		Jan 2009	Jan 2009		Jan 2009	Jan 2009
SF_6		Jan 2009	Jan 2009		Jan 2009	Jan 2009

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