CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 03 - in effect as of: 28 July 2006

CONTENTS

SECTION A. General description of project activity

A.1 Title of the project activity:

N_2O abatement in HP Nitric Acid plants at Rashtriya Chemicals & Fertilizers Limited, India
Version: 1.2
Date: 21/07/2009

A.2. Description of the project activity:

The project activity entails installation of a secondary catalyst in the ammonia reactors of one of the two nitric acid production units of fertilizer plant of Rashtriya Chemicals and Fertilizers (hereafter referred as "RCF") in India. The project activity would help in catalytic reduction of N_2O which is an undesirable by product of nitric acid production process and so emission reductions of it. N_2O is potent greenhouse gas with a very high global warming potential of 310.

RCF is a public sector undertaking of Government of India. It is one of the leading producers of fertilizer in the country. The fertilizer production facility of RCF is located in Trombay near Mumbai in the state of Maharashtra. The two units are Medium Pressure unit at 5-6 bar and High Pressure unit at 7-8 bar respectively. **The project activity is based in the High Pressure Nitric acid unit of the fertilizer plant of RCF.** Similar activity in the other unit is being proposed as a separate CDM project by RCF.

Nitric Acid Production Process:
The process of nitric acid production involves oxidation of ammonia on precious metal gauze of essentially a Platinum-Rhodium in ammonia burner in the presence of air. This is an exothermic reaction which releases substantial heat. In the process, ammonia is oxidised to form NO, which is further oxidized to form NO2, which is converted into Nitric Acid by absorbing NO_2 in water. N20 is an undesirable and unavoidable by product resulted during this process which is potent GHG and do not possess any economic value.

The production of nitric acid takes place in three process steps as shown below:

1. Ammonia combustion to form nitric oxide

$$4\ NH_3 + 5\ O_2 \rightarrow 4\ NO + 6\ H_2O$$

2. Oxidation of the nitric oxide to nitrogen dioxide

$$2\ NO + O_2 \rightarrow 2\ NO_2$$

3. Absorption of the nitrogen dioxide in water to form nitric acid

$$3\ NO_2 + H_2O \rightarrow 2\ HNO_3 + NO$$

However, there are some undesirable reactions that take place and which result in generation of N_2O.

a. $4\ NH_3 + 3\ O_2 \rightarrow 2\ N_2 + 6\ H_2O$

b. $4\ NH_3 + 4\ O_2 \rightarrow 2\ N_2O + 6\ H_2O$

In the project activity, RCF proposes to install a secondary catalyst after primary catalyst and convert N_2O into N_2 and thus reduces emission of this greenhouse gas into atmosphere.

Sustainability aspect of the project activity:
The proposed project activity has a number of sustainability aspects as described below –

- The project activity helps reducing GHG emission through abatement of N_2O from the nitric acid unit of the plant helping in global fight against climate change
- It will generate employment during construction and commissioning of the technology measure
- It will provide the necessary impetus to other similar industries to come up with such project activities in their plants
- With many projects coming up, technology suppliers/manufacturers will put in more efforts/ funds in further improvement of equipment/ machinery which will bring down the cost of such projects

A.3. Project participants:

Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) Project participants (*) (as applicable)	Kindly indicate if the party involved wishes to be considered as project participant (yes/no)
India (Host)	Rashtriya Chemicals & Fertilizers Ltd. (Public Entity)	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party(ies):

Host country: India

A.4.1.2. Region/State/Province etc.:

State: Maharashtra

A.4.1.3. City/Town/Community etc:

Town: Trombay, Sion

A.4.1.4. Detail of physical location, including information allowing the unique identification of this project activity (maximum one page):

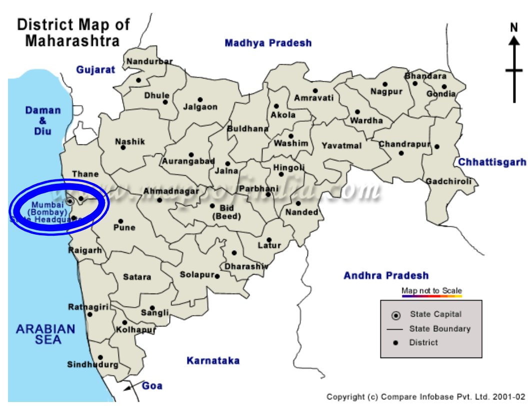
The project activity is located in Mumbai in the state of Maharashtra. The nearest airport, Santacruz in Mumbai is at a distance of ~20 km.

The latitude and longitude of the project site are 18° 56' N and 72° 51' E respectively.

On Google Earth, the project site can be reached at –

http://maps.google.com/maps?q=http:%2F%2Fbbs.keyhole.com%2Fubb%2Fdownload.php%3FNumber%3D502782&om=1&ie=UTF8&ll=18.229351,72.004395&spn=4.955073,6.306152&z=7

Physical address of project site:
Rashtriya Chemicals & Fertilizers Ltd.
"Priyadarshini" Building
Eastern Express Highway
Sion, Mumbai-400 022
Maharashtra, India



A.4.2. Category(ies) of project activity:

Approved baseline methodology **AM0034 "Catalytic reduction of N_2O inside the ammonia burner of nitric acid plants"**

Reference: Version 03.2, Sectoral Scope 05, EB 41

A.4.3. Technology to be employed by the project activity:

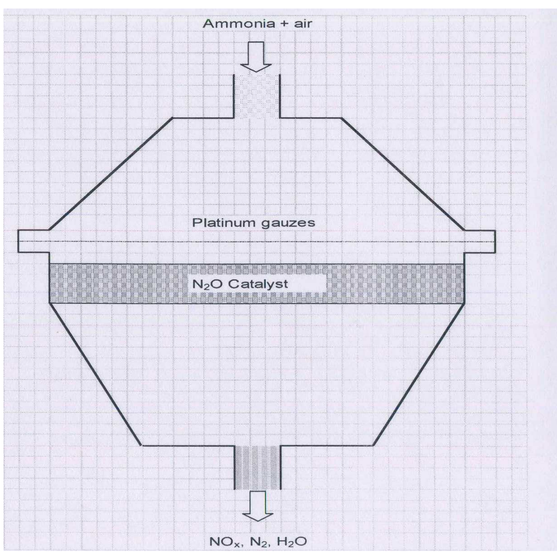
Nitric Acid (HNO_3) is produced through the oxidation of ammonia (NH_3) on precious metal catalyst gauze in the ammonia burner of a nitric acid plant. Nitrous Oxide (N_2O) is an undesirable by-product gas produced in the manufacture of nitric acid. Waste N_2O from nitric acid production is typically released into the atmosphere as it does not have any economic value at emission levels typical of nitric acid manufacture.

RCF proposes to use secondary catalyst in the ammonia burner of nitric acid unit after primary catalyst, which will reduce N_2O before its release into the atmosphere.

Technical Specifications

In this section, details of N_2O abatement technology that includes installation of secondary catalyst in ammonia oxidation reactor are given –

RCF is purchasing the catalyst from M/s BASF, one of the reputed internationally well known catalyst suppliers. The catalyst will react with N2O and result into harmless N2 formation. The catalyst will be installed just below the primary catalyst in place of rasching rings installed presently as shown below –



The technology is based on selective reduction of N2O. The reduction is done as below in an exothermic reaction.

N2O ---→ N2 + ½ O2   Δ H -82 kJ/ mol

It will not influence NOx from the reaction mixture as it is selective to N2O.

A.4.4 Estimated amount of emission reductions over the chosen crediting period:

Years	Annual estimation of emission reductions in tones of CO_2 e
2009-10	447305
2010-11	447305
2011-12	447305
2012-13	447305
2013-14	447305
2014-15	447305
2015-16	447305
Total estimated reductions **(**tonnes of CO_2 e**)**	3131135
Total number of crediting years	7 years
Annual average over the crediting period of estimated reductions **(**tonnes of CO_2e**)**	447305

A.4.5. Public funding of the project activity:

No public funding (ODA and/ or Annex 1 countries) for the project activity.

SECTION B. Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the project activity:

- Approved baseline methodology AM0034 **"Catalytic reduction of N_2O inside the ammonia burner of nitric acid plants"**
  - Reference: Version 03.2, Sectoral Scope 05, EB 41

- **Tool for the demonstration and assessment of additionality**
  - Reference: Version 05.2, EB39

B.2 Justification of the choice of the methodology and why it is applicable to the project activity:

This methodology covers project activities involving the installation of a dedicated N2O abatement catalyst inside the ammonia burner of a nitric acid plant that catalytically reduces N2O, once it has been formed in the Ammonia Oxidation Reactor.

The Baseline Methodology is applicable to project activity that installs a secondary N2O abatement catalyst inside the ammonia burner of a nitric acid plant, underneath the precious metal gauze pack. The methodology is applicable under the following conditions apply:

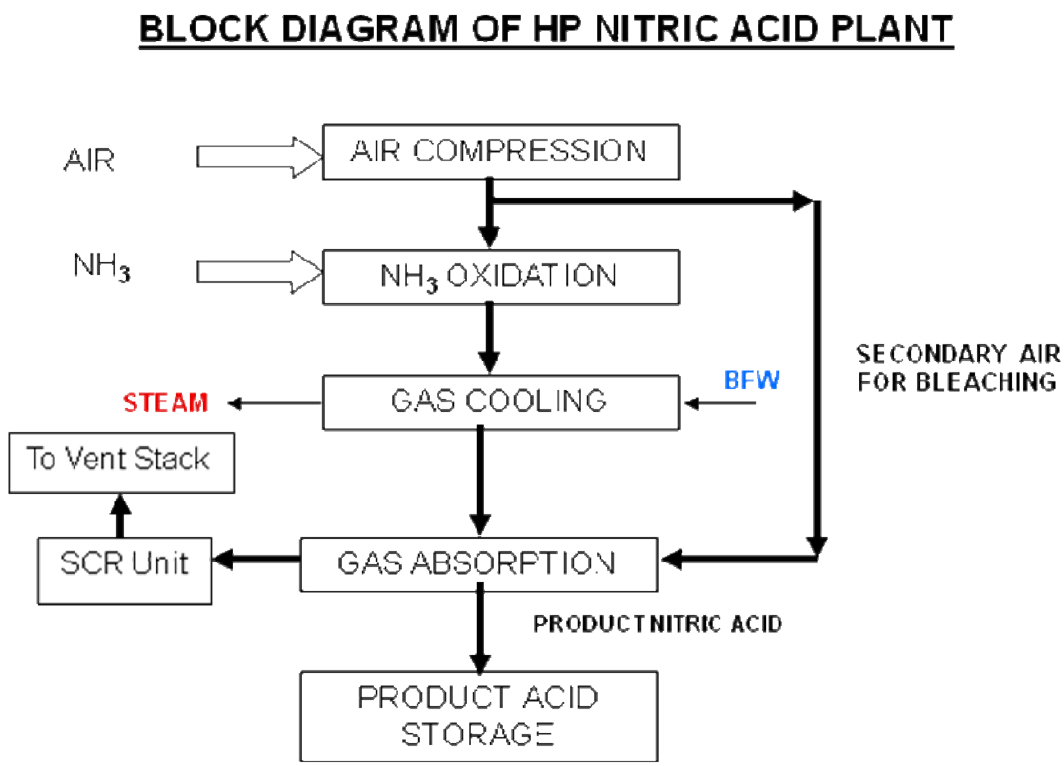
Applicability Criteria	Project Status
The applicability is limited to the existing production capacity measured in tonnes of nitric acid, where the commercial production had began no later than 31 December 2005. Definition of "existing" production capacity is applied for the process with the existing ammonia oxidization reactor where N2O is generated and not for the process with new ammonia oxidizer. Existing production "capacity" is defined as the designed capacity, measured in tons of nitric acid per year.	The nitric acid production unit of RCF is in operation well before 31 December 2005. The HP Nitric acid Unit was commissioned in the year 1968. The plant was revamped and restarted in Jan 2005. The project activity is in the ammonia oxidizer of the nitric acid production unit of RCF as described above and no new ammonia oxidizer is included in the project activity.
The project activity will not result in the shut down of any existing N2O destruction or abatement facility or equipment in the plant;	RCF would install the secondary catalyst in addition to the current system with no changes whatsoever made in the existing equipments of the nitric acid plant.
The project activity shall not affect the level of nitric acid production.	The installation of N_2O abatement measure shall have no bearing and have no direct or indirect impact on production level of nitric acid.
There are currently no regulatory requirements or incentives to reduce levels of N2O emissions from nitric acid plants in the host country.	Pollution Control norms of the state do not mandate reducing level of N_2O emissions from the nitric acid plants.

The project activity will not increase NOx emissions.	RCF will not make any changes in the production processes, which results in increase the emission levels of NOx.
NOx abatement catalyst installed, if any, prior to the start of the project activity is not a Non-Selective Catalytic Reduction (NSCR) DeNOx unit.	The nitric acid production unit is equipped with SCR DeNOx units prior to the start of project activity. The unit was made available to DOE during validation. Hence NSCR unit is not present in the plant.
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 proposed in the project activity will not lead to an increase of GHG emissions directly or indirectly. Supplier's manual on technology shall be made available for validation.
Continuous real-time measurements of N_2O concentration and total gas volume flow can be carried out in the stack: • *Prior to the installation of the secondary catalyst for one campaign, and* • *After the installation of the secondary catalyst throughout the chosen crediting period of the project activity*	RCF proposes a comprehensive monitoring/ measurement and recording system complying with the methodological requirements for real-time measurements of N_2O concentration and total volume flow from the stack for baseline (prior installation of secondary catalyst) and project activity (post installation of secondary catalyst)

B.3. Description of the sources and gases included in the project boundary

The spatial extent of the project boundary shall cover the facility and equipment for the complete nitric acid production process from the inlet to the ammonia burner to the stack. This includes all compressors, tail gas expander turbines and any NO_X abatement equipment installed. The only greenhouse gas to be included is the N_2O contained in the waste stream exiting the stack.

Flow diagrams of nitric acid plant (high pressure) are shown below to demonstrate the project boundary of the particular nitric acid plants(s) involved in the project activity.



Overview of emission sources included or excluded from the project boundary -

<table>
<tr><th></th><th>Source</th><th>Gas</th><th>Included?</th><th>Justification / Explanation</th></tr>
<tr><td rowspan="3">Baseline</td><td rowspan="3">Nitric Acid Plant (Burner Inlet to Stack)</td><td>CO_2</td><td>Excluded</td><td rowspan="2">The project does not lead to any change in CO_2 or CH_4 emissions, and, therefore, these are not included.</td></tr>
<tr><td>CH_4</td><td>Excluded</td></tr>
<tr><td>N_2O</td><td>Included</td><td></td></tr>
<tr><td rowspan="6">Project Activity</td><td rowspan="3">Nitric Acid Plant (Burner Inlet to Stack)</td><td>CO_2</td><td>Excluded</td><td rowspan="2">The project does not lead to any change in CO_2 or CH_4 emissions</td></tr>
<tr><td>CH_4</td><td>Excluded</td></tr>
<tr><td>N_2O</td><td>Included</td><td></td></tr>
<tr><td rowspan="3">Leakage emissions from production, transport, operation and decommissioning of the catalyst.</td><td>CO_2</td><td>Excluded</td><td rowspan="3">No leakage emissions are expected.</td></tr>
<tr><td>CH_4</td><td>Excluded</td></tr>
<tr><td>N_2O</td><td>Excluded</td></tr>
</table>

B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

The baseline scenario is identified using procedure for Identification of the baseline scenario described in the approved methodology AM0028 "Catalytic N2O destruction in the tail gas of Nitric Acid plants"

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

The baseline scenario alternatives should include all technically feasible options which are realistic and credible.

<u>**Step 1a:** The baseline scenario alternatives should include all possible options that are technically feasible to handle N2O emissions.</u>

Status quo:
This is the most plausible scenario in the absence of project activity. There is no mandate either from state or national pollution control boards in the country for taking up such measures as the one proposed in the project activity. The continuation of current practice would not require any investments as in the project activity and does not affect the production of nitric acid production in any way. In summary there is no incentive for the project proponent for taking up the project activity in the absence of availability of CER backed income.

Switch to alternative production method not involving ammonia oxidation process:
Project proponent have been running their nitric acid plant on the existing technology for the past decades and there is no need for them to go for an alternative technology to prevent ammonia oxidation process as the RCF's focus is nitric acid production from the unit and the existing technology is a proven technology with successful operation history. RCF is not aware of any commercially proven process other than ammonia oxidation for Nitric Acid manufacture.

Alternative use of N_2O*:*

N2O does not have any uses in the plant production process and hence can not be used elsewhere. Besides, N2O is only a fraction in the total stack gas that comes out of the tail of nitric acid plant stack. To use N2O would require separation of N2O from the stack gas.

RCF is not aware of any use of N2O for external purpose. Even if RCF finds any external use of N2O, N2O needs to be separated from tail gas coming out from the Nitric Acid plant stack, where N2O is present only in fractional part. RCF is not aware of any techno-economically feasible separation method prevalent to separate N2O from tail gas.

Installation of a Non-Selective Catalytic Reduction (NSCR) DeNOx unit:
The RCF unit is equipped with SCR DeNOx unit and installation of another NSCR DeNOx unit is not required.

The installation of an N_2O destruction or abatement technology:
Installation of an N2O destruction technology based on tertiary or secondary measures without CDM benefits is not an alternative because it would mean additional investments with no additional economic gains. Besides, taking up such measures are neither mandated nor have any impact on the plant performance.

Step 1b: In addition to the baseline scenario alternatives of step 1a, all possible options that are technically feasible to handle NOX 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 this is no mandated either. Installation of a NSCR DeNOx unit would not be required by RCF as SCR DeNOx is already there in the units.

Step 2: Eliminate baseline alternatives that do not comply with legal or regulatory requirements:

All the alternatives available to RCF are in compliance with the legal and regulatory requirements in the country. But only one alternative among all i.e. continuing status quo would be the most plausible among all and RCF would have continued with it in the absence of CER income available to the project activity.

Only alternative to the project activity is to continue with status quo i.e. no installation of secondary catalyst in the ammonia oxidizer. However, this would result in emissions of N2O from the stack resulting in no emission reductions which would happen through implementation of the project activity.

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

There is no investment barrier in continuing with the status quo, however project activity requires investments to the tune of INR 19.4 million for HP Nitric acid unit. RCF proposes to make the investments even though there is no financial gain from the project activity other than potential CER backed income.

The only alternative to project activity is not to implement the project activity and continue with status quo i.e. no N2O abatement and no emission reductions.

Sub-Step 3a: *On the basis of the alternatives that are technically feasible and in compliance with all legal and regulatory requirements, the project participant should establish a complete list of barriers that would prevent alternatives to occur in the absence of CDM.*

Continuation of current practice would not have any technological challenges however, project activity would require efforts in implementation and later on monitoring of project activity apart from the investments required. RCF would need to train the personnel on operation, maintenance, monitoring and recording of the project activity as this would be the first such case for RCF and also in the region. For implementation of project activity, infrastructure would be required to be placed at the plant site. This is one of the firsts in the country. No similar unit has so far implemented the project activity[1].

Sub-Step 3b: *Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed CDM project activity):*

There are no barriers to status quo and RCF would have continued with existing system in the absence of project activity.

Step 4: Identify the most economically attractive baseline scenario alternative:

Sub-step 4a: Determine appropriate analysis method:

The Alternative to the project activity is continuation of the plant operation without installation of N2O abatement technology. There are no financial returns attached to implementation of the project activity in the absence of CER revenue, hence Simple cost analysis (Option 1) has been considered.

Sub-step 4b: Option I: Apply simple cost analysis:
The alternative i.e. continuation of the plant without any installation of N2O abatement technology does not require any investments. Only project activity option would require investments. The investment requirement in the project activity is INR 19.4 million. Hence, project activity is not the most plausible baseline scenario**.**

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

---

[1] At the time of going for Global Stakeholder Consultation Process, M/s Deepak Fertilisers and M/s GNFC had proposed to implement the project activity in its units. But these projects are also considering the CER income.

N2O reduction project at the WNA III nitric acid plant of Deepak Fertilisers & Petrochemicals Corporation Ltd. ("Deepak"), India

N2O reduction project at the WNA I nitric acid plant of Deepak Fertilisers & Petrochemicals Corporation Ltd. ("Deepak"), India

N2O reduction project at the WNA II nitric acid plant of Deepak Fertilisers & Petrochemicals Corporation Ltd. ("Deepak"), India

Gujarat Narmada Valley Fertilizer Company (GNFC) Nitrous Oxide Abatement Project

There is no regulation in the country to regulate N2O emissions from Nitric Acid plants. In case regulations change after the project start, determination of baseline scenario shall be re assessed at the start of crediting period.

Sub Step 5a: New or modified NO_X-emission regulations

If new or modified NOX emission regulations are introduced after the project start, determination of the baseline scenario will be re-assessed at the start of a crediting period. Baseline scenario alternatives to be analysed should include, *inter alia*:

- Selective Catalytic Reduction (SCR);
- Non-Selective Catalytic Reduction (NSCR);
- Tertiary measures incorporating a selective catalyst for destroying N2O and NOX emissions;
- Continuation of baseline scenario.

For the determination of the adjusted baseline scenario the project participant should re-assess the baseline scenario and shall apply baseline determination process as stipulated above (Steps 1 – 5).

Potential outcomes of the re-assessment of the Baseline Scenario (to be in line with NOX regulation)	**Consequence (adjusted baseline scenario)**
SCR De NOX installation NSCR De NOX installation	Continuation of original (N2O) baseline scenario The N2O emissions outlet of NSCR become adjusted baseline N2O emissions, as NSCR may reduce N2O emissions as well as NOX.
Tertiary measure that combines NOX and N2O emission reduction	Adjusted baseline scenario results in zero N2O emissions reduction
Continuation of original baseline scenario	Continuation of original baseline scenario

Sub Step 5b: New or modified N_2O -regulation

If legal regulations on N_2O emissions are introduced or changed during the crediting period, the baseline emissions shall be adjusted at the time the legislation has to be legally implemented.

The methodology is applicable if the procedure to identify the baseline scenario results in that the most likely baseline scenario is the continuation of emitting N2O to the atmosphere, without the installation of N2O destruction or abatement technologies, including technologies that indirectly reduce N2O emissions (*e.g*. NSCR DeNOx units).

Summary:
As explained above, only the continuation of current practice i.e. release of N2O from stack at the current levels without implementing any of the abatement measures would happen in the absence of the project activity.

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality): >>

As per the **GUIDANCE ON THE DEMONSTRATION AND ASSESSMENT OF PRIOR CONSIDERATION OF THE CDM** –

(a) The project participant must indicate awareness of the CDM prior to the project activity start date, and that the benefits of the CDM were a decisive factor in the decision to proceed with the project. Evidence to support this would include, inter alia, minutes and/or notes related to the consideration of the decision by the Board of Directors, or equivalent, of the project participant, to undertake the project as a CDM project activity.

(b) The project participant must indicate, by means of reliable evidence, that continuing and real actions were taken to secure CDM status for the project in parallel with its implementation. Evidence to support this should include, inter alia, contracts with consultants for CDM/PDD/methodology services, Emission Reduction Purchase Agreements or other documentation related to the sale of the potential CERs (including correspondence with multilateral financial institutions or carbon funds), evidence of agreements or negotiations with a DOE for validation services, submission of a new methodology to the CDM Executive Board, publication in newspaper, interviews with DNA, earlier correspondence on the project with the DNA or the UNFCCC secretariat;

Following demonstrates the serious consideration of CDM benefits by RCF in implementation of the project under discussion-

SN	Event	Date
1	Board Note 266th meeting 25/07/2007	25/07/2007
2	Tender NIT date for CDM advisory	Sep 2007
3	Board Resolution 267th meeting 25-26/10/2007	25-26/10/2007
4	Monitoring system tender	19/12/2007
5	LOI for CDM advisory	26/12/2007
6	Stakeholder consultation process start – Newspaper advertisement date	8/1/2008
7	Tender for Catalyst	Jan 2008
8	Approval of ABB for monitoring system	8/3/2008
9	Project start date; date of contract to ABB for monitoring and instrumentation equipments	14/3/2008
10	Tender note for CDM validation	21/3/2008
11	Supply of monitoring system	Jun 2008
12	DOE finalization for validation	23/6/2008
13	Installation of monitoring system	Jun 2008
14	Start of baseline campaign	1/7/2008
15	PDD finalization	17/7/2008
16	Host Country Approval	18/8/2008
17	Board Decision on catalyst	3/9/2008

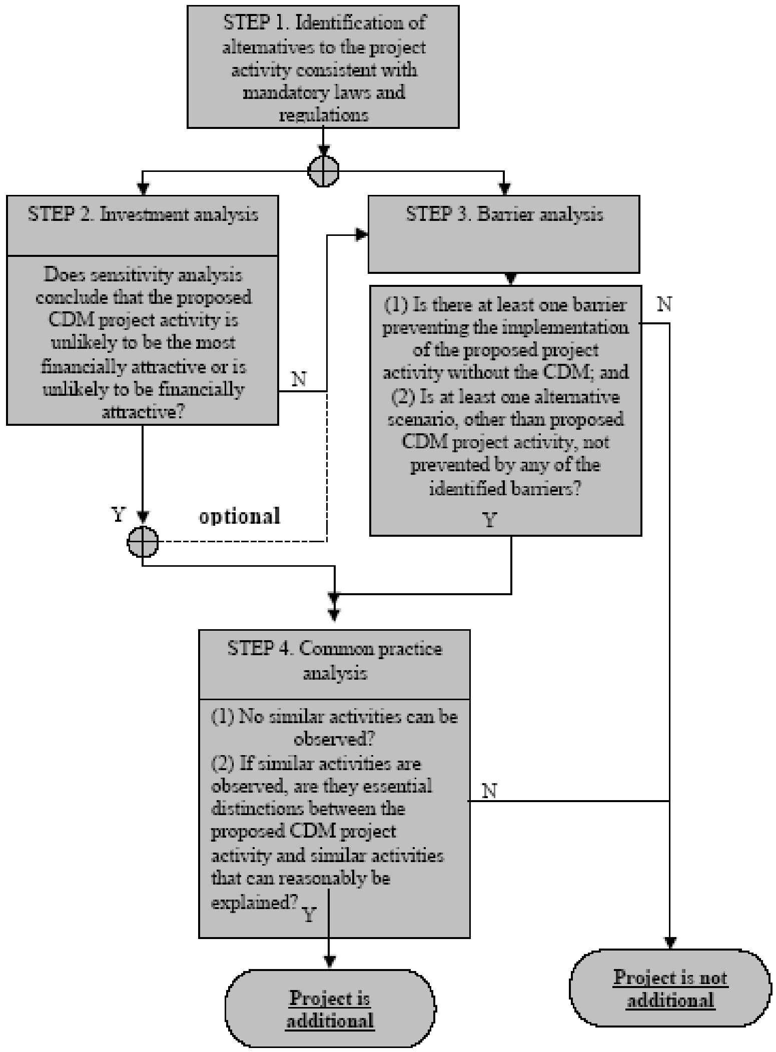
18	LOI for catalyst	13/9/2008
19	Site visit by DOE for validation	20-21/10/2008
20	Installation of secondary catalyst	30/03/2009

The above information demonstrates that not only PP considered CDM benefits during the decision making process but also started the project registration process along with the implementation of project.

Additionality of the project activity is determined based on **Tool for the demonstration and assessment of additionality** (version 05.2); EB39.

This document provides for a step-wise approach to demonstrate and assess additionality. These steps include:

1. Identification of alternatives to the project activity;
2. Investment analysis to determine that the proposed project activity is either: 1) not the most economically or financially attractive, or 2) not economically or financially feasible;
3. Barriers analysis; and
4. Common practice analysis;



Step 1: Identification of alternatives to the project activity consistent with current laws and regulations

Sub-step 1a: Define alternatives to the project activity:

This step asks for identification of other realistic and credible alternative scenario(s) to the proposed CDM project activity scenario that deliver outputs and on services (e.g. electricity) with comparable quality, properties and application areas.

Following alternatives have been identified as plausible alternative options in the absence of project activity –

1. The proposed project activity not undertaken as a CDM project activity

2. Continuation of current practice of N2O release in open atmosphere without installation of secondary catalyst in ammonia burner.

Sub step 1b. Consistency with mandatory laws and regulations:

Both the alternatives listed above are well in line with the regulatory requirements of the state and central authority in India and neither of these is prohibited from prevailing rules and regulations. Thus, both the alternatives qualify for the next step of the tool.

Step 2: Investment analysis

As per the Tool, in this section it is demonstrated that the project activity is not a financially viable option to the project proponent. The project activity does not offer any tangible gains to the project proponent. The only tangible gain from the project activity comes through CER sale that this project is expected to accrue.

Option I "***Apply simple cost analysis"*** *is chosen* as there are no economic benefits from the project activity other than expected CDM related income.

Following table gives the estimated implementation cost of the project activity –

Parameter	Details	Remarks
Project Cost	INR19.4 million for HP Nitric Acid unit	As per Detailed Cost estimates
Equity	100%	Project is funded 100% through internal accruals

Apart from the initial cost on implementation of the project, RCF would need to make provision for annual costs for replacement of catalysts and annual maintenance of the monitoring systems etc. Estimated annual cost for the project activity is approximately INR 6.4 million.

Investment in the project activity won't happen if CDM related income is not available to the project activity.

Step 3: Barrier Analysis

Sub-step 3 (a): Identify barriers that would prevent the implementation of the proposed CDM project activity:

Investment barriers, other than the economic/financial barriers in Step 2 above:

The project activity incurs ~ INR19.4 million for the HP Nitric acid unit as cost towards implementation. The investments are being made only to mitigate the impact of N2O that is released in the atmosphere from the nitric acid plant of RCF. There is no other financial gain to RCF for doing the project activity. In the absence of CDM related income made available to the project activity, it would be difficult to implement the project and N2O release in open atmosphere would continue. Other than the capital cost

involved in the project activity, recurring expenses on secondary catalyst and related maintenance would be there.

The only objective of taking up the project activity is to abate release of N2O from nitric acid plant and help mitigate the greenhouse impact.

Technological barriers:

RCF is in the process of finalizing the technology of N_2O abatement. This is the first time RCF is undertaking such a project activity in its unit. RCF would need to install a number of monitoring instruments and a data acquisition/reporting system apart from installation of secondary catalyst in the ammonia oxidizer. The primary focus of RCF is to produce nitric acid from the unit and it is not mandated from state/ national EPAs to control emission of N_2O. Implementation of project activity would require longer stoppage time of plant during installation of secondary catalyst, determination of baseline and putting up all the additional monitoring system as per the methodology requirements. RCF would also need to get its people trained to work on new system and also ensure that these modifications do not have any adverse bearing on plant performance.

There is a possibility of leaching of new secondary catalyst taking place which can get deposited in downstream equipments leading to shut down of the plant for the cleaning of equipments or even it may lead to long term effect like enhance the corrosion rate of equipments.

Heat generated in secondary catalyst may affect the uneven basket expansion leading to shutdown of the plant for basket modifications/strengthening.

Sub- step 3(b): Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed project activity):

All the barriers as described above pose many obstacles for the project activity to occur and are specific to project activity as the only option available to project activity is not implement it and continue with current level of N2O release in atmosphere. There is no mandate from local EPA to implement such a project activity besides its being capital intensive with no economic return available other than CDM related returns.

Step 4: Common Practice analysis

Sub-step 4a: Analyze other activities similar to the proposed project activity:

In India, there are a number of Nitric Acid plants. These nitric acid plants by their very nature release a number of undesired gases including N2O. In the absence of any mandate to control N2O release, plants do not opt for any abatement method to control its release. There is no plant having N2O abatement facility at the time of proposed project implementation. Following are the details of other Nitric Acid plants operating in the country –

Plant Name	CDM Yes/ No	Reference
Deepak Fertilisers	Yes	N2O reduction project at the WNA III nitric acid plant of Deepak Fertilisers & Petrochemicals Corporation Ltd.

		(“Deepak”), India
Deepak Fertilisers	Yes	N2O reduction project at the WNA II nitric acid plant of Deepak Fertilisers & Petrochemicals Corporation Ltd. (“Deepak”), India
Deepak Fertilisers	Yes	N2O reduction project at the WNA I nitric acid plant of Deepak Fertilisers & Petrochemicals Corporation Ltd. (“Deepak”), India
Gujarat Narmada Valley Fertilizer Company (GNFC)	Yes	Gujarat Narmada Valley Fertilizer Company (GNFC) Nitrous Oxide Abatement Project
NFL	Yes	Report available in public domain

There is no similar activity in the country which is happening without the CDM benefits.

Sub-step 4b: Discuss any similar Options that are occurring:

As explained in the section above, there is no similar activity in the country which is happening without the CDM benefits.

Summary:
As evident from above discussion, N2O abatement in nitric acid plants in the country is neither mandated nor is financially tenable projects. The project attracts no tangible gain other than the expected CER revenue and thus is additional over business-as-usual scenario. In the absence of project activity, RCF would have continued with the existing practice of no abatement of N2O in nitric acid production leading to continuing emission of greenhouse gases with no climate change mitigation. Another barrier to implementation of the project activity is non-availability of catalyst without sharing the CER benefit with catalyst suppliers. The Selected catalyst supplier M/s BASF is also sharing CDM revenue with project proponent i.e. RCF.

B.6. Emission reductions:

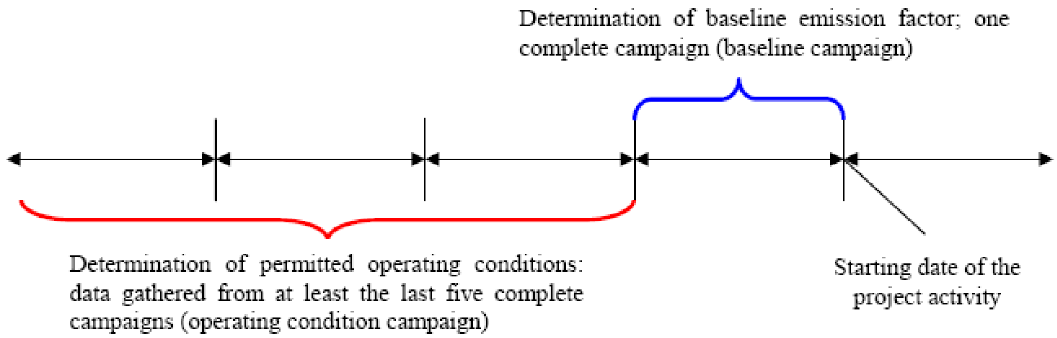
B.6.1. Explanation of methodological choices:

As per the methodology AM0034, following equations would apply in estimation/ calculation of baseline and project emissions from the project activity.

Baseline Emissions

The baseline has been established through continuous monitoring of both N2O concentration and gas flow volume in the stack of the nitric acid plant for one complete campaign starting from 1st July 08 to 7th November 2008[2], prior to project implementation. The data is attached along with the PDD in Annex 3. The schematic of procedure is as below -

[2] Ending 24:00 hours on 07/11/2008



1. Determination of the permitted operating conditions of the nitric acid plant to avoid overestimation of baseline emissions:

As required in the methodology, the normal ranges for operating conditions have been determined for the following parameters:

(i) Oxidation temperature;
(ii) Oxidation pressure;
(iii) Ammonia gas flow rate, and
(iv) Air input flow rates.

The data for these parameters is routinely logged in the process control systems of the RCF plant. The permitted range has been established using the procedures described below.

i. Oxidation temperature and pressure:

Process parameters to be monitored are the following:

Data Code	Description	Unit of Measurement
OT_h	Oxidation temperature for each hour	(°C)
OP_h	Oxidation pressure for each hour	(kg/cm2)
OT_{normal}	Normal range for oxidation temperature	(°C)
OP_{normal}	Normal range for oxidation pressure	(kg/cm2)

As suggested in the methodology, permitted range for oxidation temperature and pressure has been determined using option (a) i.e. Historical data for the operating range of temperature and pressure from the previous five campaigns excluding abnormal campaigns.

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. All data that falls within the upper and lower 2.5% percentiles of the sample distribution is 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 observation lie) and maximum operating conditions (value of parameter exceeded by 2.5% of observations).

The historical campaigns considered for establishing the permitted operating conditions for the project activity are as follows –

Campaign 1	Date: 8/11/2005 To 12/03/2006
Campaign 2	Date: 13/03/2006 to 14/11/2006
Campaign 3	Date: 17/11/2006 to 17/6/2007
Campaign 4	Date: 21/06/2007 to 18/01/2008
Campaign 5	Date: 20/01/2008 to 01/07/2008

Out of a total of 13984 values available, 2.5% of the top and bottom values are excluded to determine the permitted range of oxidation pressure and oxidation temperature respectively.

Based on the data of last five campaigns run in the plant, following set of permitted range is established. It is also demonstrated that the permitted range is within the specification of the facility.

Parameters	**Historical Values**	**Specification of the facility**	**Permitted Range**	**Unit**
Oxidation Temp Range	900-863	930-860	900-863	Deg C
Oxidation Pressure Range[3]	6.60-6.26	7.65[4]	6.60-6.26	barg[5]
	660-626	765	660-626	kPa

ii. Ammonia gas flow rates and ammonia to air ratio input into the ammonia oxidation reactor (AOR):

Parameters to be monitored **-**

Data Code	**Description**	**Unit of Measurement**
AFR	Ammonia gas flow rate to the AOR	(tNH_3/h)
AFR_{max}	Maximum ammonia gas flow rate to the AOR	(tNH_3/h)
AIFR_	Ammonia to air ratio	(%)
$AIFR_{max}$_	Maximum ammonia to air ratio	(%)

As per the methodology, the upper limits for ammonia flow and ammonia to air ratio shall be determined using option (a) i.e. Historical maximum operating data for hourly ammonia gas and ammonia to air ratio for the previous five campaigns excluding abnormal campaigns.

[3] PP has been measuring the pressure of ammonia flow just before the oxidation reactor historically. The design value also corresponds to the same point of measurement. In the baseline campaign too, PP has measured the pressure at the same point for consistency and enabling comparison. It is an industry practice.

[4] The design data for pressure is given for the maximum permitted limit only.

[5] 1 Pa = 10^{-5} bar. Methodology gives unit of measurement in Pa. But RCF were measuring this parameter in bar. In the project activity however, RCF would be converting this measure value in kPa in CEM System supplied by M/s ABB for the Base line & project activity.

It is demonstrated that the permitted ranges for pressure, temperature, ammonia flow rate and ammonia to air ratio are within the specifications of the facility.

RCF would operate the nitric acid plant within the permitted range.

Parameters	Historical Values	Specification of the facility	Permitted Range	Unit
Ammonia Flow Rate (Max)	6725			Nm3/ h[6]
	5113	6075.9	5113	kg/ h
	5.113	6.076	5.113	tNH3/h
Ammonia - air ratio (Max)[7]	11.9	11.5	11.5	%

2. Determination of baseline emission factor: measurement procedure for N2O concentration and gas volume flow

RCF proposes measurement procedure using an Automated Monitoring System (AMS) for N2O concentration and gas volume flow to meet European Norm 14181.

This monitoring system would provide separate readings for N2O concentration and gas flow volume for a defined period of time (e.g. every hour of operation, it provides an average of the measured values for the previous 60 minutes).

Error readings (e.g. downtime or malfunction) and extreme values would be automatically eliminated from the output data series by the monitoring system.

Following statistical procedure has been applied to data obtained after eliminating data measured for periods where the plant operated outside the permitted ranges:

a) Calculate the sample mean (x)
b) Calculate the sample standard deviation (s)
c) Calculate the 95% confidence interval (equal to 1.96 times the standard deviation)
d) Eliminate all data that lie outside the 95% confidence interval
e) Calculate the new sample mean from the remaining values (volume of stack gas (VSG) and N2O concentration of stack gas (NCSG))

The average mass of N2O emissions per hour is estimated as product of the NCSG and VSG.

The N2O emissions per campaign are estimates product of N2O emission per hour and the total number of complete hours of operation of the campaign using the following equation:

---

[6] The methodology gives unit of measurement in tNH3/h but RCF have been measuring the parameter in Nm3/ h. The conversion factor from Nm3/ h to kgNH3/ h is 0.7602 (which is 17.03/22,4). RCF would be converting this measure value in kg/ h in CEM system supplied by M/s ABB for the baseline and the project activity.

[7] This is the ratio of ammonia flow to ammonia-air mix in the reactor. Same has been considered in the baseline campaign too for consistency and direct comparison.

$$BE_{BC} = VSG_{BC} \times NCSG_{BC} \times OH_{BC} \times 10^{-9} \qquad (tN_2O) \qquad \textbf{(1)}$$

The plant specific baseline emissions factor representing the average N2O emissions per tonne of nitric acid over one full campaign is derived by dividing the total mass of N2O emissions by the total output of nitric acid (as 100% concentrated) for that period. The overall uncertainty of the monitoring system has also been determined and the measurement error is expressed as a percentage (UNC).

The N2O emission factor per tonne of nitric acid produced in the baseline period (EF_{BL}) shall then be reduced by the estimated percentage error as follows:

$$EF_{BL} = \left(1 - \frac{UNC}{100}\right)\left(\frac{BE_{BC}}{NAP_{BC}}\right) \qquad (tN_2O/tHNO_3) \qquad \textbf{(2)}$$

Where:

Variable		Definition
EF_{BL}	=	Baseline N_2O emissions factor ($tN_2O/tHNO_3$)
BE_{BC}	=	Total N_2O emissions during the baseline campaign (tN_2O)
$NCSG_{BC}$	=	Mean concentration of N_2O in the stack gas during the baseline campaign (mgN_2O/m3)
OH_{BC}	=	Total operating hours of the baseline campaign (h)
VSG_{BC}	=	Mean gas volume flow rate at the stack in the baseline measurement period (m^3/h)
NAP_{BC}	=	Total nitric acid production during the baseline campaign ($tHNO_3$)
UNC	=	Overall uncertainty of the monitoring system (%), calculated as the combined uncertainty of the applied monitoring equipment

Impact of regulations:

There is no regulation in India to cap emissions of N2O from nitric acid plants. Hence the resulting EF_{BL} will be used as the baseline emission factor. If legal regulations on N_2O emissions are introduced or changed during the crediting period, the baseline emissions shall be adjusted at the time the legislation has to be legally implemented.

Composition of the ammonia oxidation catalyst:

RCF proposes to use the same type of catalyst as used in the last five campaigns and project activity and there won't be any change. However these catalysts are fabricated (based on RCF's metal and catalyst specification) by three available reputed vendors (M/s Hindustan Platinum, M/s Ravidra Heraeus and M/s Aurora Mathey, these parties are fabricators only and they work for us on labour charge basis). However, in the event of such a change in catalyst composition, it shall be established that:

(i) The baseline catalyst composition is considered as common practice in the industry, or

(ii) The change in catalyst composition is justified by its availability, performance, relevant literature etc.

If the nitric acid plant operator has changed the composition of the ammonia oxidation catalyst in a project campaign to a composition not used in the baseline campaign, the project proponent would:

Repeat the baseline campaign to determine a new baseline emissions factor (tN2O/tHNO3), compare it to the previous baseline emissions factor and adopt the lower figure as EF_{BL}, or

Parameters to be monitored for composition of the catalyst are as follows:

GS_{normal}	Gauze supplier for the operation condition campaigns
GS_{BL}	Gauze supplier for baseline campaign
$GS_{project}$	Gauze supplier for the project campaign
G_{normal}	Gauze composition for the operation condition campaigns
GC_{BL}	Gauze composition for baseline campaign
$GC_{project}$	Gauze composition for the project campaign

The details can be referred from sections B.6.2 & B.7.1

Campaign Length
The historic campaign lengths and the baseline campaign length (running hours of plant) have been determined and it shall be compared to the project campaign length[8].

Historic Campaign Length
The average historic campaign length (CL_{normal}) defined as the average campaign length for the historic campaigns used to define operating condition (the previous five campaigns), will be used as a cap on the length of the baseline campaign.

Parameters	Historical Value	Unit
Normal Campaign Length	44435	tHNO3

Baseline Campaign Length (CL_{BL})

If $CL_{BL} <= CL_{normal}$

Then all N2O values measured during the baseline campaign shall be used for the calculation of EF_{BL} (subject to the elimination of data that was monitored during times where the plant was operating outside of the "permitted range").

If $CL_{BL} > CL_{normal}$

N2O values that were measured beyond the length of CL_{normal} during the production of the quantity of nitric acid (i.e. the final tonnes produced) are to be eliminated from the calculation of EF_{BL}.

Project Emissions

[8] Campaign length is defined as the total number of metric tonnes of nitric acid at 100% concentration produced with one set of gauzes.

Over the duration of the project activity, N2O concentration and gas volume flow in the stack of the nitric acid plant as well as the temperature and pressure of ammonia gas flow and ammonia-to-air ratio, will be measured continuously.

Estimation of campaign-specific project emissions:

The monitoring system has been installed using the guidance document EN 14181 and will provide separate readings for N2O concentration and gas flow volume for a defined period of time (e.g. every hour of operation, i.e. an average of the measuring values of the past 60 minutes).

Error readings (e.g. downtime or malfunction) and extreme values are automatically eliminated from the output data series by the monitoring system. Next, the same statistical evaluation that is applied to the baseline data series shall be applied to the project data series:

a) Calculate the sample mean (x)
b) Calculate the sample standard deviation (s)
c) Calculate the 95% confidence interval (equal to 1.96 times the standard deviation)
d) Eliminate all data that lie outside the 95% confidence interval
e) Calculate the new sample mean from the remaining values

$$PE_n = VSG \times NCSG \times OH \times 10^{-9} \quad (tN_2O) \quad \textbf{(3)}$$

Where:

Variable		Definition
VSG	=	Mean stack gas volume flow rate for the project campaign (m^3/h)
$NCSG$	=	Mean concentration of N_2O in the stack gas for the project campaign (mgN_2O/m^3)
PE_n	=	Total N_2O emissions of the nth project campaign (tN_2O)
OH	=	Is the number of hours of operation in the specific monitoring period (h)

Derivation of a moving average emission factor:

In order to take into account possible long-term emissions trends over the duration of the project activity and to take a conservative approach a moving average emission factor shall be estimated as follows:

Step1: estimate campaign specific emissions factor for each campaign during the project's crediting period by dividing the total mass of N2O emissions during that campaign by the total production of 100% concentrated nitric acid during that same campaign.

For example, for campaign n the campaign specific emission factor would be:

$$EF_n = PE_n / NAP_n \quad (tN_2O/tHNO_3) \quad \textbf{(4)}$$

Step 2: estimate a moving average emissions factor be calculated at the end of a campaign n as follows:

$$EF_{ma,n} = (EF_1 + EF_2 + \ldots + EF_n)/n \qquad (tN_2O/tHNO_3) \qquad \textbf{(5)}$$

This process is repeated for each campaign such that a moving average, $EF_{ma,n,}$ is established over time, becoming more representative and precise with each additional campaign.

To calculate the total emission reductions achieved in a campaign in formula (7) below, the higher of the two values $EF_{ma,n}$ and EF_n shall be applied as the emission factor relevant for the particular campaign to be used to calculate emissions reduction s (EF_p). Thus:

$$\text{If } EF_{ma,n} > EF_n \text{ then } EF_p = EF_{ma,n} \qquad \textbf{(6)}$$
$$\text{If } EF_{ma,n} < EF_n \text{ then } EF_p = EF_n$$

Where:

Variable	Definition
EF_n	Emission factor calculated for a specific project campaign ($tN_2O/tHNO_3$)
$EF_{ma,n}$	Moving average (ma) emission factor of after n^{th} campaigns, including the current campaign ($tN_2O/tHNO_3$)
n	Number of campaigns to date
EF_p	Emissions factor that will be applied to calculate the emissions reductions from this specific campaign (i.e. the higher of EF_x and EF_n) ($N_2O/tHNO_3$)

Minimum project emission factor:

A campaign-specific emissions factor shall be used to cap any potential long-term trend towards decreasing N2O emissions that may result from a potential built up of platinum deposits. After the first ten campaigns of the crediting period of the project, the lowest EF_n observed during those campaigns will be adopted as a minimum (EF_{min}). If any of the later project campaigns results in a EF_n that is lower than EF_{min}, the calculation of the emission reductions for that particular campaign shall used EF_{min} and not EF_n.

where:

Variable	Definition
EF_{min}	Is equal to the lowest EF_n observed during the first 10 campaigns of the project crediting period ($N_2O/tHNO_3$)

Project Campaign Length

a. Longer Project Campaign

If the length of each individual project campaign CL_n is longer than or equal to the average historic campaign length CL_{normal}, then all N2O values measured during the baseline campaign can be used for the calculation of EF (subject to the elimination of data from the Ammonia/Air analysis, see above).

b. Shorter Project Campaign

If $CL_n < CL_{normal}$, recalculate EF_{BL} by eliminating those N2O values that were obtained during the production of tonnes of nitric acid beyond the CL_n (i.e. the last tonnes produced) from the calculation of EF_n.

Leakage

No leakage calculation is required.

Emission Reductions

The emission reductions for the project activity over a specific campaign are determined by deducting the campaign-specific emission factor from the baseline emission factor and multiplying the result by the production output of nitric acid (measured as 100% basis) over the campaign period and the GWP of N2O:

$$ER = (EF_{BL} - EF_p) \times NAP \times GWP_{N_2O} \qquad (tCO_2e) \qquad (7)$$

Where:

Variable		Definition
ER	=	Emission reductions of the project for the specific campaign (tCO_2e)
NAP	=	Nitric acid production for the project campaign (tHNO3). The maximum value of NAP shall not exceed the design capacity.
EF_{BL}	=	Baseline emissions factor ($tN_2O/tHNO_3$)
EF_p	=	Emissions factor used to calculate the emissions from this particular campaign (i.e. the higher of $EF_{ma,n}$ and EF_n)
GWP_{N_2O}	=	Global warming potential for the N_2O as per IPCC default value

The design capacity of the unit is ‘at least’ 352 MT/ day or **yearly production cap would be at 128480 (352x365) MT of Nitric Acid**. In equation (7) of methodology, any nitric acid production over and above this cap will not be considered.

B.6.2. Data and parameters that are available at validation:

(Copy this table for each data and parameter)

Data / Parameter:	**B.1 AFR_{max}**
Data unit:	Nm3/h

Description:	Maximum ammonia flow rate
Source of data used:	Plant records
Value applied:	6725 (This is equivalent to 5.113 tNH3/ h)
Justification of the choice of data or description of measurement methods and procedures actually applied :	To be obtained from operating condition campaign. As per the methodology the value has been estimated from B.10 AFR values of the past 5 campaigns of the ammonia oxidation reactor.
Any comment:	The methodology gives unit of measurement in tNH3/h but RCF have been measuring the parameter in Nm3/ h in the past. The conversion factor from Nm3/ h to tNH3/ h is 0.7602 (which is 17.03/22.4). RCF would be converting this measured value in kg/ h for the project activity.

Data / Parameter:	**B.2 $AIFR_{max}$**
Data unit:	%
Description:	Maximum ammonia to air ratio
Source of data used:	Calculated
Value applied:	11.5
Justification of the choice of data or description of measurement methods and procedures actually applied :	To be obtained from operating condition campaign. As per the methodology the value has been estimated from B.12 AIFR values of the past 5 campaigns of the ammonia oxidation reactor.
Any comment:	

Data / Parameter:	**B.3 OT_{normal}**
Data unit:	Deg C
Description:	Normal operating temperature
Source of data used:	Monitored
Value applied:	Max = 900 Min = 863
Justification of the choice of data or description of measurement methods and procedures actually applied :	As per the methodology, Option (a) is selected, the permitted range is determined through a statistical analysis of the historical data in which the time series data is interpreted as a sample for a stochastic variable. All data that falls within the upper and lower 2.5% percentiles of the sample distribution is defined as abnormal and is eliminated. The permitted range of operating temperature and pressure is then assigned as the historical minimum (value of parameter below which 2.5% of the observation lie) and maximum operating conditions (value of parameter exceeded by 2.5% of observations).
Any comment:	--

Data / Parameter:	**B.4 OP $_{normal}$**
Data unit:	bar
Description:	Normal operating pressure
Source of data used:	Monitored
Value applied:	Max = 6.60 (660 kPa) Min = 6.26 (626 kPa)
Justification of the choice of data or description of measurement methods and procedures actually applied :	As per the methodology, Option (a) is selected, the permitted range is determined through a statistical analysis of the historical data in which the time series data is interpreted as a sample for a stochastic variable. All data that falls within the upper and lower 2.5% percentiles of the sample distribution is defined as abnormal and is eliminated. The permitted range of operating temperature and pressure is then assigned as the historical minimum (value of parameter below which 2.5% of the observation lie) and maximum operating conditions (value of parameter exceeded by 2.5% of observations).
Any comment:	1 Pa = 10^$^{-5}$ bar. Methodology gives unit of measurement in Pa. But RCF were measuring this parameter in bar. In the project activity however, RCF would be converting this measuring value in kPa for the project activity

Data / Parameter:	**B.5 GS $_{BL}$**
Data unit:	-
Description:	Gauze supplier for the baseline campaign
Source of data used:	Monitored
Value applied:	Rashtriya Chemicals & Fertilizer Ltd
Justification of the choice of data or description of measurement methods and procedures actually applied :	Obtained during the baseline campaign
Any comment:	Rashtriya Chemicals & Fertilizer Ltd is getting fabricated the catalyst gauge from three vendors (Base line vendor RHPL) RHPL/HPL/Aurora Mathey, on labour charge basis, giving them metal and specification of catalyst

Data / Parameter:	**B.6 GC $_{BL}$**
Data unit:	-
Description:	Gauze composition during baseline campaign
Source of data used:	Monitored
Value applied:	Pt – 92%, Rh – 8%
Justification of the	Used during the baseline campaign

choice of data or description of measurement methods and procedures actually applied :	
Any comment:	--

Data / Parameter:	B.7 $NCSG_{BC}$
Data unit:	mgN2O/Nm3
Description:	N2O concentration in the stack gas
Source of data used:	N2O analyzer
Value applied:	For the baseline campaign run by RCF during 01/07/2008 and 07/11/2008, the N2O concentration value comes at 4054.1 mg N2O/ Nm3.
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data output from N2O analyser to be processed using appropriate software. RCF have in place a Continuous Emission Monitoring (CEM) system from ABB.
Any comment:	Regular calibrations is done according to ISO 9000 procedure. This analyzer is tested as per Qual2 test of recognized industry standards (EN 14181) by Third Party TUV Sud Germany. Staff has been trained in maintenance of monitoring instrument. Staff is also trained in monitoring procedures and a reliable technical support infrastructure is set up. Frequency of monitoring: Every two seconds

Data / Parameter:	B.8 VSG_{BC}
Data unit:	Nm3/h
Description:	Volume flow rate of the stack gas
Source of data used:	From CEM system supplied by M/s ABB along with analyser
Value applied:	For the baseline campaign run by RCF during 01/07/2008 and 07/11/2008, the Volume flow rate of stack gas comes at 49077.4 Nm3/ h
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data output from the stack flow meter to be processed with appropriate software. RCF would have in place a Continuous Emission Monitoring (CEM) system from ABB.
Any comment:	Regular calibrations according to ISO 9000 procedure and this instrument was tested as per Qual2 test of recognized industry standards (EN 14181) by Third Party TUV Sud Germany. Staff is trained in monitoring procedures and a reliable technical support infrastructure is set up.

	Frequency of recording: every two seconds data are recorded

Data / Parameter:	**B.9 OH_{BC}**
Data unit:	Hours
Description:	Operating hours
Source of data used:	From CEM system
Value applied:	For the baseline campaign run by RCF during 01/07/2008 and 07/11/2008, the operating hours comes at 2861 hours.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Recorded at CEM System based on temperature limits of Reactor, the hours of daily operation of the plant during a campaign
Any comment:	Included in evaluation by third party validator. Frequency of recording: compiled hourly for entire campaign

Data / Parameter:	**B.10 NAP_{BC}**
Data unit:	tHNO3
Description:	Nitric Acid (As 100%) over baseline campaign
Source of data used:	This is a calculated data based on the following - 1) Quantity of dilute nitric acid from Mass flow meter 2) Average concentration of nitric acid determined by the plant Laboratory for the day.
Value applied:	For the baseline campaign run by RCF during 01/07/2008 and 07/11/2008, the Nitric Acid production comes at 43326 tHNO3
Justification of the choice of data or description of measurement methods and procedures actually applied :	**Nitric Acid Flow:** Mass flow meter installed at project site and displayed on CEM system gives hourly average flow of dilute nitric acid (from the day report of CEM system). Plant laboratory determines the average concentration of nitric acid for the day. Hourly value is multiplied with average concentration to arrive at hourly nitric acid production. The sum of hourly production is used to calculate day production. **Nitric Acid concentration:** Concentration is determined by measuring specific gravity by hydrometer and temperature by thermometer. Chart indicating concentration at various temperatures, specific gravity, available with production department is used for determining concentration of product nitric acid.
Any comment:	**Nitric Acid Flow:** Calibration of flow meter once in 3 years as per OEM recommendation. **Nitric Acid concentration:**

	Calibration of Hydrometer and Thermometer shall be ensured by ISO 9000 procedures. Frequency of recording: Hourly compiled for entire campaign. In case Mass flow meter is not functioning for any period during the day, Nitric acid Production for the day is calculated using Average Ammonia Specific consumption for previous three operating days and Ammonia consumption for plant for the day from meter no FI 120101. The calculated production value for the day is used for further processing; all other data from the Nitric acid mass flow meter for this day is ignored. In case concentration of nitric acid has not been determined for the day due to any reasons like shutdown, start-up etc, then: • In case of shut down data for concentration is taken from previous day. • In case of start-up data for concentration is taken from next day. • In case of shut down and start-up both data for concentration is taken from average of previous available day and next available day. • For any other reason not foreseen now decision from production in charge of the plant is taken for correctness of data based on reason of not availability. He gives decision whether previous day data to be used or next day data to be used Operation manager Nitric acid plant takes appropriate decision for replacing the mass flow meter with similar or better instrument, if they are made available by instrument vendors in future.

Data / Parameter:	**B.11 CL_{BL}**
Data unit:	tHNO3
Description:	Length of baseline campaign
Source of data used:	As per production data
Value applied:	43326
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated from Nitric Acid production.
Any comment:	Frequency of monitoring: After end of each campaign

Data / Parameter:	**B.12 CL_{normal}**
Data unit:	tHNO3
Description:	Normal campaign length
Source of data used:	Calculated from nitric acid production data
Value applied:	44435

Justification of the choice of data or description of measurement methods and procedures actually applied :	Average historical campaign length during the operation condition campaign
Any comment:	Frequency of monitoring: Prior to the end of baseline campaign

Data / Parameter:	**B.13 GS $_{normal}$**
Data unit:	-
Description:	Normal gauze supplier for the operating condition campaigns, There are three Gauge fabricators for RCF, they work on labour charge basis for gauze fabrication, precious metal and specification is given by RCF. Hence RCF is the gauge supplier.
Source of data used:	Plant data
Value applied:	Rashtriya Chemicals & Fertilizer Ltd (RCF)
Justification of the choice of data or description of measurement methods and procedures actually applied :	Obtained from operating condition campaign
Any comment:	Frequency of recording: Each campaign, (RCF is getting fabricated the catalyst gauge from any one of three parties RHPL/HPL/Aurora Mathey, on labour charge basis giving them metal and specification of catalyst)

Data / Parameter:	**B.14 GC $_{normal}$**
Data unit:	-
Description:	Gauze composition during the operation campaigns
Source of data used:	Monitored
Value applied:	-
Justification of the choice of data or description of measurement methods and procedures actually applied :	Obtained during the operating condition campaign.
Any comment:	Frequency of recording: Each campaign

B.6.3 Ex-ante calculation of emission reductions:

Baseline estimation has been done on baseline campaign. RCF has carried out the baseline campaign during the validation period. Procedures on data measurement recoding and actual data are available for validation.

For estimation of emission reductions from the project activity, following information has been used -

HP Nitric Acid Plant: Following is the sample calculation for HP nitric acid production unit-

Particulars	**352 HP**	**Unit**
Volume flow rate of stack gas	49077	Nm3/h
N2O concentration in stack gas - baseline	4054.1	mg N2O/ Nm3
Operating hours	2861	h/campaign
Baseline emissions	569.2	tN2O/ campaign
Uncertainty UNC	4.52%	
HNO3 production	43326	tHNO3/ campaign
N2O emission factor - baseline	0.0125	tN2O/ tHNO3
N2O concentration in stack gas - project	405.41	mg N2O/ Nm3
Project emissions	56.92	tN2O/ campaign
N2O emission factor - project	0.0013	tN2O/ tHNO3
GWP	310	tCO2/ tN2O
Emission Reductions	147059	tCO2/ campaign
Campaign per annum	3.04	per annum
Design Capacity	128480	per annum
Project emissions	52328.0	tCO2/ annum
Baseline emissions	499633.0	tCO2/ annum
Emission Reductions	447305.0	tCO2/ annum

In estimation of annual emission reductions, RCF took 3.04 campaigns for HP Nitric acid plant for estimation purpose.

B.6.4 Summary of the ex-ante estimation of emission reductions:

Year	**Estimation of project activity emissions (tonnes of CO2e)**	**Estimation of baseline emissions (tonnes of CO2e)**	**Estimation of leakage (tonnes of CO2e)**	**Estimation of overall emission reductions (tonnes of CO2e)**
2009-10	52328	499633	0	447305
2010-11	52328	499633	0	447305
2011-12	52328	499633	0	447305
2012-13	52328	499633	0	447305
2013-14	52328	499633	0	447305
2014-15	52328	499633	0	447305
2015-16	52328	499633	0	447305
Total (tonnes of CO2e)	**366296**	**3497431**	**0**	**3131135**

B.7 Application of the monitoring methodology and description of the monitoring plan:

B.7.1 Data and parameters monitored:

(Copy this table for each data and parameter)

Data / Parameter:	**NCSG**
Data unit:	mgN2O/Nm3
Description:	N2O concentration in the stack gas
Source of data to be used:	N2O analyser
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	N2O analyser to be used for the data measurement processed using appropriate software. RCF have in place a Continuous Emission Monitoring (CEM) system from ABB.
QA/QC procedures to be applied:	N2O monitor have auto calibration feature. Regular calibrations will be done according to ISO 9000 procedure. This analyzer is tested as per Qual2 test of recognized industry standards (EN 14181) by Third Party TUV Sud Germany. Staff has been trained in maintenance of monitoring instrument. Staff will also be trained in monitoring procedures and a reliable technical support infrastructure will be set up.
Any comment:	Frequency of monitoring: Every two seconds

Data / Parameter:	**VSG**
Data unit:	Nm3/h
Description:	Volume flow rate of the stack gas
Source of data to be used:	from CEM System
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	The data output from the stack flow meter is processed using appropriate software. RCF have in place a Continuous Emission Monitoring (CEM) system from ABB.
QA/QC procedures to be applied:	Regular calibrations according to ISO 9000 procedure and this instrument was tested as per Qual2 test of recognized industry standards (EN 14181) by Third

	Party TUV Sud Germany.
Any comment:	Frequency of monitoring: Every two seconds.

Data / Parameter:	**OH**
Data unit:	Hours
Description:	Operating hours
Source of data to be used:	From CEM system
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	Recorded at CEM System based on temperature limits of Reactor hours of daily operation of the plant during a campaign
QA/QC procedures to be applied:	Included in evaluation by third party validator.
Any comment:	In case Logic is not functioning for any period, data from log book will be taken. Frequency of recording: Hourly compiled for entire campaign

Data / Parameter:	**NAP**
Data unit:	tHNO3
Description:	Nitric Acid (As 100%)
Source of data to be used:	This is a calculated data based on the following - 1) Quantity of dilute nitric acid from Mass flow meter 2) Average concentration of nitric acid determined by the plant Laboratory for the day.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	**Nitric Acid Flow:** Mass flow meter installed at project site and displayed on CEM system shall give hourly average flow of dilute nitric acid (from the day report of CEM system). Plant laboratory will determine the average concentration of nitric acid for the day. Hourly value shall be multiplied with average concentration to arrive at hourly nitric acid production. The sum of hourly production shall be used to calculate day production. **Nitric Acid concentration:** Concentration will be determined by measuring specific gravity by hydrometer

	and temperature by thermometer. Chart indicating concentration at various temperatures, specific gravity, available with production department shall be used for determining concentration of product nitric acid.
QA/QC procedures to be applied:	**Nitric Acid Flow:** Calibration of flow meter once in 3 years as per OEM recommendation **Nitric Acid concentration:** Calibration of Hydrometer and Thermometer shall be ensured by ISO 9000 procedures
Any comment:	Frequency of recording: Hourly compiled for entire campaign. In case Mass flow meter is not functioning for any period during the day, Nitric acid Production for the day shall be calculated using Average Ammonia Specific consumption for previous three operating days and Ammonia consumption for plant for the day from meter no FI 120101. The calculated production value for the day shall be used for further processing; all other data from the Nitric acid mass flow meter for this day shall be ignored. In case concentration of nitric acid has not been determine for the day due to any reasons like shutdown, start-up etc, then: • In case of shut down data for concentration shall be taken from previous day. • In case of start-up data for concentration shall be taken from next day. • In case of shut down and start-up both data for concentration shall be taken from average of previous available day and next available day. • For any other reason not foreseen now decision from production in charge of the plant shall be taken for correctness of data based on reason of not availability. He will give decision whether previous day data to be used or next day data to be used Operation manager Nitric acid plant shall take appropriate decision for replacing the mass flow meter with similar or better instrument, if they are made available by instrument vendors in future.

Data / Parameter:	**TSG**
Data unit:	Deg C
Description:	Temperature of stack gas
Source of data to be used:	Continuous Emission Monitoring system from ABB
Value of data applied for the purpose of calculating expected emission reductions in	-

section B.5	
Description of measurement methods and procedures to be applied:	Probe (part of gas volume flow meter)
QA/QC procedures to be applied:	Regular calibrations according to ISO 9000 procedure and this instrument was tested as per Qual2 test of recognized industry standards (EN 14181) by Third Party TUV Sud Germany.
Any comment:	Frequency of monitoring: Every two seconds

Data / Parameter:	**PSG**
Data unit:	hPa
Description:	Pressure of stack gas
Source of data to be used:	Continuous Emission monitoring system from ABB
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	Probe (part of gas volume flow meter)
QA/QC procedures to be applied:	Regular calibrations according to ISO 9000 procedure and this instrument was tested as per Qual2 test of recognized industry standards (EN 14181) by Third Party TUV Sud Germany.
Any comment:	Frequency of recording: Every two seconds.

Data / Parameter:	**AFR**
Data unit:	kg NH_3/ h
Description:	Ammonia gas flow rate to AOR
Source of data to be used:	From CEM System
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	To be obtained from operating condition campaign. Ammonia flow meter is used. Transmitted from DCS.
QA/QC procedures to be applied:	Included in evaluation by third party validator.
Any comment:	Frequency of monitoring: Continuous

Data / Parameter:	**UNC**
Data unit:	%
Description:	Overall measurement uncertainty of the monitoring system
Source of data to be used:	Calculated combined uncertainty factor determined by M/s TUV during Qual2 Test of monitoring equipment as per EN14181 guide line
Value of data applied for the purpose of calculating expected emission reductions in section B.5	4.52
Description of measurement methods and procedures to be applied:	Qual2 Test by Third Party Validator M/s TUV Sud Germany of Instrument As per guideline of EN14181
QA/QC procedures to be applied:	-
Any comment:	Frequency of monitoring: Once after monitoring system is commissioned

Data / Parameter:	**AIFR**
Data unit:	-
Description:	Ammonia to air ratio
Source of data to be used:	From CEM System
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	Obtained from operating condition campaign Transmitted from DCS
QA/QC procedures to be applied:	-
Any comment:	Frequency of monitoring : Every hour

Data / Parameter:	**OT_h**
Data unit:	Deg C
Description:	Oxidation temperature of each hour
Source of data to be used:	Continuous Emission Monitoring (CEM) system from ABB.
Value of data applied for the purpose of calculating expected emission reductions in	-

section B.5	
Description of measurement methods and procedures to be applied:	Obtained from operating condition campaign transmitted from DCS
QA/QC procedures to be applied:	-
Any comment:	Frequency of monitoring: Every hour

Data / Parameter:	**OP_h**
Data unit:	kPa
Description:	Oxidation pressure of each hour
Source of data to be used:	Continuous Emission Monitoring (CEM) system from ABB.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	Obtained from operating condition campaign transmitted from DCS
QA/QC procedures to be applied:	-
Any comment:	Frequency of monitoring: Every hour

Data / Parameter:	**$GS_{project}$**
Data unit:	-
Description:	Gauze supplier for project campaign
Source of data to be used:	Plant data
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	To be obtained during the project campaign.
QA/QC procedures to be applied:	-
Any comment:	Frequency of recording: Each campaign

Data / Parameter:	**$GC_{project}$**

Data unit:	-
Description:	Gauze composition during project campaign
Source of data to be used:	Monitored
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	To be obtained during the project campaign.
QA/QC procedures to be applied:	-
Any comment:	Frequency of recording: Each campaign

Data / Parameter:	**EF_{reg}**
Data unit:	
Description:	Emissions level set by incoming policies or regulations
Source of data to be used:	Monitored data
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Zero
Description of measurement methods and procedures to be applied:	-
QA/QC procedures to be applied:	-
Any comment:	Updated when new regulations comes into force

B.7.2 Description of the monitoring plan:

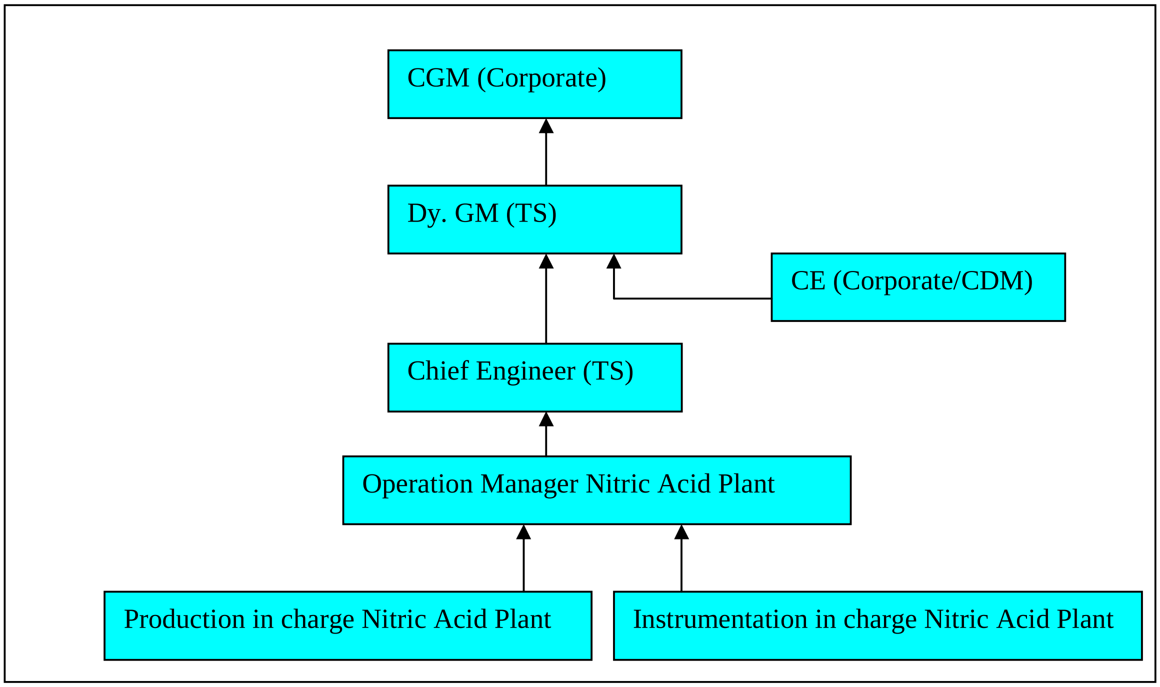
RCF is an ISO 9001 certified company and has procedure for monitoring and recording of data on operation of the plant/ equipments. The equipments/ instruments used for CDM project are also part of these procedures.

1. **CDM Team for monitoring & recording of data:**

A CDM project team is constituted with participation from relevant sections. This team is responsible for data collection and archiving. This team will periodically review CDM project activity, check data collected and estimate emissions reduced. On a monthly basis, the monitoring reports will be checked

and discussed by the senior CDM team members. In case of any irregularity observed by any of the CDM team members, it will be informed to the concerned person for necessary actions. Further these reports will then be forwarded to the management monthly basis.

Organisational structure for monitoring plan



Detailed description of responsibility of monitoring shall be available in CDM Manual.

1. **Data collection and record keeping:**

Frequency of data monitoring and recording
The frequency for data monitoring is as per the monitoring details in Section B.7.1 of the document.

Archiving of data
Data shall be kept for two years after the crediting period or the last issuance which ever is later

2. **Quality Control and Quality Assurance**

RCF proposes a monitoring system which complies to EN 14181. As per the system detailed out in the methodology AM0034, a three level quality assurance is planned. These three levels are QAL1, QAL2 and QAL3.

QAL 1 precisely ensures the suitability of the CEM to meet the requirements. RCF has already undergone this level and a report has been availed from reputed certifying agency.

The monitoring system has been installed in the plant and QAL2 procedure has been carried out by M/s TUV to ensure the correctness of installations.

Under QAL 3, RCF would ensure the continuous correctness of the monitoring system.

Description of the CEM installed at RCF HP Nitric Acid plant –

1. Components of CEM

RCF has installed in its HP Nitric Acid plant an Continuous Emission Monitoring (CEM) system from M/s ABB AO2000 URAS 26 comprising of Continuous Emissions Analyser (for N2O concentration of stack gas), Sample probe, Sample Conditioning System, SDF Flow Sensor (for stack gas flow measurement).

Datalogger: Beckhoff DATA Logger
Data Acquisition System: ITBK EMI3000

2. Selection of Sample points

RCF proposes sample points for collection of samples to meet the requirements of EN 14181. The sample points have been selected as advised by the supplier ensuring its correctness,

3. Analyser System

The ABB AO2000 URAS 26 is capable of analysing N_2O concentration in gas mixtures on continuous basis. The URAS 26 is continuous NDIR industrial photometer that can selectively measure concentrations of up to four sample components. In this case it is equipped for the measurement of N_2O only. The analyzer features gas-filled opto-pneumatic detectors. Detector is filled with corresponding gas being measured. This means that the detector provides optimum sensitivity and high selectivity compared with the other gas components in the sample. Gas-filled calibration cells are used for automatic calibration. The Analyser is QAL1 tested for the measurement of N_2O.

4. Sample Conditioning System

The gas sample is extracted at the sampling point, particles are removed by the heated filter unit and the clean sample gas is delivered through a heated sampling line to the analyser cabinet. Before being fed to the analyser, moisture is removed by the sample gas cooler and sample gas feed unit installed side-by-side in the analyser cabinet. This sample gas cooler unit maintains a constant dew point of the sample gas of 3°C and efficiently separates the moisture from the sampling gas. The minimum flow rate to the analyser is controlled and connected to an alarm. The dry gas after the cooler is controlled for moisture break through. In case of moisture leaks in due to a failure of the cooler, the sampling pump will be stopped automatically and an alarm is given to the EMI3000 system.

5. Flow Meter

The SDF Flow measuring system allows continuous determination of the flow rate of stack gas. It is performance tested according to 17.BlmSchG and “TA Luft” (test report No. 936/802015, TUV Rheinland 1993) for use in plants.

The SDF flow sensor which is a flow measuring device is a highly sensitive system for continuous, in-situ flow measurement. The stack gas flow is measured in the stack by measuring the dynamic differential pressure generated by the SDF flow sensor probe rod and using ABB’s Differential pressure transmitter. Thereby the differential pressure is continuously measured and the signal is feed to Beckhoff DATA Logger and ITBK EMI3000 – CDM Data acquisition and data evaluation system.

The signal resulting from the differential pressure is proportional to the velocity of exhaust flow gas.

The ABB’s Differential pressure transmitter produces a signal in proportion to the flow which is provided as 4…20 mA – signal to the Beckhoff DATA Logger. The stack gas pressure and temperature is also measured separately by transmitters and the corresponding 4 – 20 mA signal generated is feed to DATA Logger as input for further converting the stack flow from operating to standard conditions. This is done by EMI3000 by compensating the flow for pressure and temperature and correcting the volume flow.

6. The data acquisition system

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

7. Emergency preparedness

There is no plausible scenario in the project activity which can lead to emergency situation leading to unaccounted GHG emissions during the crediting period. It may be noted that in the project activity, RCF is installing a secondary catalyst and there is no change in the process. The emissions that were happening in the baseline would be reduced due to secondary catalyst.

The emissions are monitored using CEM system which complies to EN-14181 as required by the methodology in the project activity.

It is expected that all the instruments shall be functioning continuously for recording data. However following provision/methodology will be adopted during any failure of monitoring instruments.

Failure of Data Acquisition System	A Provision of auto backup of data is provided in the system so that data is retrieved even if the system is down for 22 days. In case, due to any reason data is not available due to failure of data recording following shall be considered - Data for stack meter shall be ignored while averaging and data for production has to be considered according to

	procedure given for failure of NAP (Nitric acid Production) measuring instrument i.e. Mass Flow Meter. However in case of failure of individual instruments following procedure shall be followed.
Failure of N2O Analyzer (NCSG)	In case N2O analyzer is not functioning, data for the period shall be ignored for calculating the campaign average
Failure of Stack gas Flow meter (VSG)	In case Stack gas flow meter is not functioning, hourly average of measured data for next hour shall be considered for the down period, for taking further processing.
Failure of Stack Gas Pressure (PSG)	In case Stack gas pressure meter is not functioning, Hourly average of measured data for next hour shall be considered for the down period, for taking further processing.
Failure of Stack gas Temperature (TSG)	In case Stack gas Temperature meter is not functioning, Hourly average of measured data for next hour shall be considered for the down period, for taking further processing.
Operating Hours OH	In case Operating hours meter is not functioning, Data from Shift log book shall be taken after ascertaining for how many hours the plant has run.
Failure of Mass Flow meter (NAP)	In case Mass flow meter is not functioning any time during the day, Nitric acid Production for the day shall be calculated using Average Ammonia Specific consumption for previous three operating days and Ammonia consumption for plant for the day from meter no FI 120101. The production data for the day shall be used for further processing; all other data from the Nitric acid mass flow meter for this day shall be ignored.
Operating Temperature(OT)	In case operating Temperature meter is not functioning, average of measured data for previous hour and next available hours, shall be considered for the down period, for taking further processing
Operating Pressure(OP)	In case operating Pressure meter is not functioning, average of measured data for previous hour and next available hours, shall be considered for the down period, for taking further processing
Ammonia Flow (AFR)	In case Ammonia Flow meter is not functioning, Hourly average of measured data for previous hour shall be considered for the down period, for taking further processing.
Ammonia to Air Ratio (AIFR)	In case Ammonia to Air Ratio meter is not functioning, Hourly average of measured data for previous hour shall be considered for the down period, for taking further processing

B.8 Date of completion of the application of the baseline study and monitoring methodology and the name of the responsible person(s)/entity(ies)

Date: 10/12/2008

Mr P.M.C. Nair
Priyadarshini, 10th Floor
Eastern Express Highway
Sion, Mumbai – 400 022
Maharashtra

Phone- 91-22- 25523054/25523075
Fax: 91-22-25523045
E-mail: pmcnair@rcfltd.com

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

14/03/2008 (the date of contract with ABB for supply of Monitoring Equipments and Instruments)

C.1.2. Expected operational lifetime of the project activity:

21 years

C.2 Choice of the crediting period and related information:

C.2.1. Renewable crediting period

C.2.1.1. Starting date of the first crediting period:

01/10/2009 (But not before the date of registration)

C.2.1.2. Length of the first crediting period:

7 years

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

NA

C.2.2.2. Length:

NA

SECTION D. Environmental impacts

D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

The project activity does not require EIA to be conducted as per EIA notification SO 195(E)[9] of EPA in India. The project activity has only positive impact on environment. The project activity would have GHG emission reductions through abatement of N2O from the stack of nitric acid plant of RCF. Local pollution authorities have been informed.

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

No significant environmental impact due to project activity is envisaged.

SECTION E. Stakeholders' comments

E.1. Brief description how comments by local stakeholders have been invited and compiled:

RCF has adopted following methodology for conducting stakeholder consultation –

- Publishing newspaper advertisement calling for comments/ suggestions from people at large
- Intimating decision makers/ local peoples' representatives and seek their opinion on project activity
- Sending information on project activity to local workers' union and have their consent in implementing the project
- RCF would continue seeking approvals regularly from local EPA for the plant operations including project activity to show that the project activity does not violate any of the EPA's environment performance requirements.

E.2. Summary of the comments received:

RCF had published advertisements in local newspapers on the project activity. The advertisement was published in *Navshakti* (Marathi Daily) and Free Press Journal (English Daily) on January 8, 2008. It contained information of the contact person at RCF to entertain people's views and comments. The comments were invited through mails/ emails/ phone/ fax and ample time was given to people to respond to.

In response to the advertisement company received two letters. One letter from a resident from local community and other from General Secretary– RCF Employees Union was received. Both appreciated efforts from RCF.

---

[9] http://www.envfor.nic.in/legis/eia/so195.pdf

RCF conducted a local meeting on 12/03/2008 at its premises with employees to apprise them of the project activity and its impact on environmental performance. It detailed out the company's plan to seek its registration as CDM project activity under Kyoto protocol.

Summary of these interactions and comments received are given below –

Q1. Is there is any adverse effect on production?
A1. There is no adverse affect on production due to installation of catalyst.

Q2. Why this mechanism of CDM is there?
A2. This mechanism has been prepared with aim of reducing green house gases.

Q3. After 2012 what will happen?
A3. We are still not very clear what will happen after Dec 2012, most probably Kyoto agreement will stay with some modifications as agreed by the developed and developing countries.

Q4. Pollution is created more by developed country, then why they are forcing us to reduce it?
A4. No Country is forcing us to reduce GHG emission, it is purely voluntary to undertake CDM project. However they are providing us incentive in the form of CER revenue to implement these type of projects.

Q5. Is there possibility of quoting high price instruments and catalyst supply by foreign bidders?
A5. There is possibility of quoting high price for instruments and catalyst supplies. However this will not be a possibility as sufficient competition is there among suppliers.

Q6. Is there a prescribed procedure for validating the data and instruments?
A6.Yes, but they are guidelines only.

Q7. What is the purpose of this programme?
A7. Aim of these CDM programme are to reduce green house gases all over the world, As effort from only developed country to reduce green house gases may not be sufficient, to save the earth.

Q8. What is operator's role in the CDM project?
A8. The role of operator is to operate the modified plant efficiently as they were doing previous to the modifications.

Q9. What is the catalyst made off?
A9. As presently we are talking to three vendors. All the three vendors have different kind of catalyst. Two of them are offering non precious metal based catalyst and one of the vendors is giving precious metal based catalyst.

Q10. What is the cost of implementation?
A10. The cost of implementation was divided in two parts. First part is for procurement of additional monitoring instruments. 2nd part is for procurement of catalyst. As still the vendor for catalyst is not decided, at this point of time, we do not know the total cost of implementation.

Q11. Whether project has been checked for economic viabilities?
A11.Yes, without CER revenue there is no revenue generation from the project, with CDM registration CER revenue is the source of revenue.

Q12. Is there any other benefit from this project?
A12. There is no other monetary benefit from the project.

Q13. What is current CER price?
A13. CER price varies from time to time like share prices, and for indication purpose CER price can be taken 20 US$.

Q14. Whether this benefit is available if we put up new plant?
A14. If we put up a new plant the benefit will not be available.

E.3. Report on how due account was taken of any comments received:

No adverse against the project activity,

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	**Rashtriya Chemicals and Fertilizers (RCF)**
Street/P.O.Box:	Eastern Express Highway, Sion
Building:	Priyadarshini, 10th Floor
City:	Mumbai
State/Region:	Maharashtra
Postfix/ZIP:	400 022
Country:	India
Telephone:	91-22- 25523054/25523075
FAX:	91-22-25523045
E-Mail:	
URL:	www.rcfltd.com
Represented by:	
Title:	Chief General Manager (Corporate)
Salutation:	Mr.
Last Name:	Nair
Middle Name:	Mohana Chandran
First Name:	Parameshwaran
Department:	Corporate
Mobile:	91-09969001340
Direct FAX:	91-22-25523045
Direct tel:	91-22- 25523054/25523075
Personal E-Mail:	pmcnair@rcfltd.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

NO FUNDING FROM ANNEX-1 COUNTRIES OR THROUGH ODA CONSIDERED FOR THE PROJECT ACTIVITY.

Annex 3

BASELINE INFORMATION

RCF ran baseline campaign between 01/07/2008 – 07/11/2008. Out of the data available, PP ran four tests for Oxidation Pressure, Oxidation Temperature, Ammonia Flow Rate and Ammonia-air ratio to demonstrate that the baseline data is within the range of permitted operating range of these parameters respectively.

The values which were outside the permitted range of these parameters are excluded and estimation of Volume Flow Rate of Stack Gas and N2O Concentration in stack gas is done only for data which is found to be within the permitted range and lie within the 95% confidence interval. Out of a total of 2866 data values in the baseline 1747 data values are found to be within the permitted range of operating parameters which is ~60% i.e. more than the minimum requirement of 50% prescribed in the methodology. Also, it is demonstrated that the average values of the baseline operating parameters are representative of normal operating conditions through statistical analysis.

Historical Campaign	**OP**	**OT**	**AFR**	**AIFR**
	Bar	deg C	Nm3/h	ratio
Mean Value	6.46	887	6278.75	0.102
SD	0.06	8.6	2025.52	0.001
SD*1.96	0.12	16.90	3970.0	0.003
Mean+SD*1.96	6.59	904	10248.8	0.104
Mean-SD*1.96	6.34	870	2308.7	0.099
Baseline Mean Value	**6.53**	**890.6**	**6121.1**	**0.103**
Is it in the range	**Yes**	**Yes**	**Yes**	**Yes**

However, nitric acid production and operating hours are considered for the entire baseline campaign in the estimation of Baseline N2O Emission factor as per the methodology.

Following information is extracted from the baseline campaign –

Volume flow rate of stack gas –

Sample mean	49175	Nm3/ h
Standard Deviation	1582	
95% Confidence interval	3101	
New sample mean	**49077.4**	**Nm3/ h**

N2O Concentration in stack gas –

Sample mean	4103.5	mg/ Nm3
Standard Deviation	679.2	
95% Confidence interval	1331	

New sample mean	**4054.1**	**mg/ Nm3**

N2O Emissions during baseline campaign –

Mean gas volume flow rate at the stack in the baseline measurement period (Nm3/h)	49077
Mean concentration of N2O in the stack gas during the baseline campaign (mgN2O/Nm3)	4054.1
Total operating hours of the baseline campaign (h)	2861
Total N2O emissions during the baseline campaign (tN2O)	**569.2**

Baseline N2O Emission factor –

Total N2O emissions during the baseline campaign (tN2O)	569.2
Total nitric acid production during the baseline campaign (tHNO3)	43326
Overall uncertainty of the monitoring system (%), calculated as the combined uncertainty of the applied monitoring equipment	4.52%
Baseline N2O emissions factor (tN2O/tHNO3)	**0.0125**

Annex 4

MONITORING INFORMATION

Please refer section B.6 and B.7 for details of monitoring information for the project activity.

\- - - - -