
VALIDATION REPORT

N.serve Environmental Services GmbH

Project for the catalytic reduction of N₂O emissions with a secondary catalyst inside the ammonia reactor of the nitric acid plant at Dongbu Hannong Chemicals Ltd., Korea (“Dongbu”)

SGS Climate Change Programme

SGS United Kingdom Ltd
SGS House
217-221 London Road
Camberley Surrey
GU15 3EY
United Kingdom

Date of Issue:	Project Number:
22 nd October 2007	CDM.VAL0904
Project Title:	Organisational unit:
Project for the catalytic reduction of N ₂ O emissions with a secondary catalyst inside the ammonia reactor of the nitric acid plant at Dongbu Hannong Chemicals Ltd., Ulsan, Korea ("Dongbu").	SGS Climate Change Programme
Revision Number:	Client:
0	N.serve Environmental Services GmbH
<p>Summary:</p> <p>N.serve Environmental Services has commissioned SGS to perform the validation of the 'Project for the catalytic reduction of N₂O emissions with a secondary catalyst inside the ammonia reactor of the nitric acid plant at Dongbu Hannong Chemicals Ltd., Ulsan, Korea ("Dongbu")'. The scope of the validation is defined as an independent and objective review of the project design document, the project's baseline study and monitoring plan and other relevant documents. The information in these documents is reviewed against Kyoto Protocol requirements, UNFCCC rules and associated interpretations. SGS has employed a risk-based approach in the validation, focusing on the identification of significant risks for project implementation and the generation of CERs.</p> <p>In accordance with decisions of EB31, N.Serve and SGS agree that review of the permitted operating conditions is not within the scope of this validation work.</p> <p>The report is based on the findings of documents reviews, the stakeholder consultation process and responses from the project participants to the findings raised in this report.</p> <p>The report and the annexed validation describes a total 11 of findings which include:</p> <ul style="list-style-type: none"> • 7 Corrective Action Requests; and • 4 New Information Requests. <p>All the findings have been closed out and hence the project will be recommended to the EB with a request for registration.</p>	
Subject:	Indexing Terms
CDM validation	
Team Members:	
Siddharth Yadav – Lead Assessor Dirk Peeters	
Technical Review:	<input checked="" type="checkbox"/> No Distribution (without permission from the Client or responsible organisational unit)
Name: Irma Lubrecht	<input type="checkbox"/> Limited Distribution
Authorized Signatory:	<input type="checkbox"/> Unrestricted Distribution
Name: Irma Lubrecht	
Date of Final Decision:	
16 th November 2007	Number of Pages: 40

Abbreviations

AMS	Automated Monitoring System
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
COP/MOP	Conference of Parties / Meeting of Parties
DNA	Designated National Authority
DOE	Designated Operational Entity
EB	Executive Board of the clean development mechanism
EIA	Environmental Impact Assessment
GHG	Greenhouse gas
IETA	International Emission Trading Association
IPCC	Intergovernmental Panel on Climate Change
LoA	Letter of Approval
MP	Monitoring Plan
NGO	Non Governmental Organization
NIR	New Information Request
NSCR	Non-Selective Catalytic Reduction
PDD	Project Design Document
PP	Project Participant
SCR	Selective Catalytic Reduction
UNFCCC	United Nations Framework Convention on Climate Change

Table of Content

1.	Introduction	5
1.1	Objective.....	5
1.2	Scope.....	5
1.3	GHG Project Description	5
1.4	The Names and Roles of the Validation Team Members.....	5
2.	Methodology	6
2.1	Review of CDM-PDD and Additional Documentation	6
2.2	Use of the Validation Protocol	6
2.3	Findings	6
2.4	Internal Quality Control	7
3.	Determination Findings	8
3.1	Participation Requirements.....	8
3.2	Baseline Selection and Additionality	8
3.3	Application of Baseline Methodology and Calculation of Emission Factors	9
3.4	Application of Monitoring Methodology and Monitoring Plan	11
3.5	Project Design	11
3.6	Environmental Impacts	11
3.7	Local Stakeholder Comments	11
4.	Comments by Parties, Stakeholders and NGOs	12
4.1	Description of How and When the PDD was Made Publicly Available	12
4.2	Compilation of all Comments Received.....	12
4.3	Explanation of How Comments Have Been Taken into Account.....	12
5.	Validation Opinion	13
6.	List of Persons Interviewed	14
7.	Document References	15
A.1	Annex 1: Local Assessment	16
A.2	Annex 2: Validation Protocol	17
A.3	Annex 3: Findings Overview.....	33
A.4	Annex 4: Statements of Competency of Validation Team.....	39

1. Introduction

1.1 Objective

N.serve Environmental Services GmbH has commissioned SGS to perform the validation of the 'Project for the catalytic reduction of N₂O emissions with a secondary catalyst inside the ammonia reactor of the nitric acid plant at Dongbu Hannong Chemicals Ltd., Ulsan, Korea ("Dongbu")' with regard to the relevant requirements for CDM project activities. The purpose of a validation is to have an independent third party assess the project design. In particular, the project's baseline, the monitoring plan (MP) and the project's compliance with relevant UNFCCC and host country criteria are validated in order to confirm that the project design as documented is sound and reasonable and meets the stated requirements and identified criteria. Validation is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of Certified Emission Reduction (CER). UNFCCC criteria refer to the Kyoto Protocol criteria and the CDM rules and modalities and related decisions by the COP/MOP and the CDM Executive Board.

1.2 Scope

The scope of the validation is defined as an independent and objective review of the project design document, the project's baseline study and monitoring plan and other relevant documents. The information in these documents is reviewed against Kyoto Protocol requirements, UNFCCC rules and associated interpretations. SGS has employed a risk-based approach in the validation, focusing on the identification of significant risks for project implementation and the generation of CERs.

In accordance with decisions from EB31, N.serve and SGS have agreed that review of the permitted operating conditions of the plant is not within the scope of this validation work.

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

1.3 GHG Project Description

The sole purpose of the proposed project activity is to significantly reduce current levels of N₂O emissions from the production of nitric acid at Ulsan fertiliser factory owned by Dongbu Hannong Chemicals Ltd. which produces Compound Fertilizers, Sulphuric Acid, Nitric Acid and Purified Phosphoric Acid. The nitric acid plant was designed by Weatherly and commissioned in 1992; it is a single burner high pressure plant which has operated at a pressure of between 13.25 and 14.75 bar and existing design production capacity for the project activity is 90,000 tonnes of 100% concentrated nitric acid per year (based on 300 operating days per year and a daily nameplate capacity of 300 tonnes of nitric acid).

The project involves installation of a new N₂O abatement technology; a palletised catalyst that will be installed inside the ammonia oxidation reactor, underneath the precious metal gauzes. The implementation of the project through installation of this catalyst will reduce between 80% and 90% of current N₂O emissions.

1.4 The Names and Roles of the Validation Team Members

Name	Role
Siddharth Yadav	Lead Assessor
Dirk Peeters	Expert

Statement of Competence of team members are attached at Annex IV.

2. Methodology

2.1 Review of CDM-PDD and Additional Documentation

The validation is performed primarily as a document review of the publicly available project documents. The assessment is performed by trained assessors using a validation protocol.

A site visit is usually required to verify assumptions in the baseline. Additional information can be required to complete the validation, which may be obtained from public sources or through telephone and face-to-face interviews with key stakeholders (including the project developers and Government and NGO representatives in the host country). These may be undertaken by the local SGS affiliate. The results of this local assessment are summarized in Annex 1 to this report.

2.2 Use of the Validation Protocol

The validation protocol used for the assessment is partly based on the templates of the IETA / World Bank Validation and Verification Manual and partly on the experience of SGS with the validation of CDM projects. It serves the following purposes:

- it organises, details and clarifies the requirements the project is expected to meet; and
- it documents both how a particular requirement has been validated and the result of the validation.

The validation protocol consists of several tables. The different columns in these tables are described below.

Checklist Question	Means of Verification (MoV)	Comment	Draft and/or Final Conclusion
<i>The various requirements are linked to checklist questions the project should meet.</i>	<i>Explains how conformance with the checklist question is investigated. Examples of means of verification are document review (DR) or interview (I). N/A means not applicable.</i>	<i>The section is used to elaborate and discuss the checklist question and/or the conformance to the question. It is further used to explain the conclusions reached.</i>	<i>This is either acceptable based on evidence provided (Y), or a Corrective Action Request (CAR) due to non-compliance with the checklist question (See below). New Information Request (NIR) is used when the validation team has identified a need for further clarification.</i>

The completed validation protocol for this project is attached as Annex 2 to this report

2.3 Findings

As an outcome of the validation process, the team can raise different types of findings

In general, where insufficient or inaccurate information is available and clarification or new information is required the Assessor shall raise a **New Information Request (NIR)** specifying what additional information is required.

Where a non-conformance arises the Assessor shall raise a **Corrective Action Request (CAR)**. A CAR is issued, where:

- mistakes have been made with a direct influence on project results;
- validation protocol requirements have not been met; or
- there is a risk that the project would not be accepted as a CDM project or that emission reductions will not be verified.

The validation process may be halted until this information has been made available to the assessors' satisfaction. Failure to address a NIR may result in a CAR. Information or clarifications provided as a result of an NIR may also lead to a CAR.

Observations may be raised which are for the benefit of future projects and future verification or validation actors. These have no impact upon the completion of the validation or verification activity.

Corrective Action Requests and New Information Requests are raised in the draft validation protocol and detailed in a separate form (Annex 3). In this form, the Project Developer is given the opportunity to "close" outstanding CARs and respond to NIRs and Observations.

2.4 Internal Quality Control

Following the completion of the assessment process and a recommendation by the Assessment team, all documentation will be forwarded to a Technical Reviewer. The task of the Technical Reviewer is to check that all procedures have been followed and all conclusions are justified. The Technical Reviewer will either accept or reject the recommendation made by the assessment team.

3. Determination Findings

3.1 Participation Requirements

Germany was identified as the Annex I party in the PDD Version 1. But no Letter of Approval (LoA) was provided. CAR1 was raised. The project participants decided to apply for a LoA with the United Kingdom's Designated National Authority rather than with Germany. United Kingdom has ratified the Kyoto Protocol on 31 May 2002 and has appointed a Designated National Authority. N.serve Environmental Services GmbH and Johnson Matthey PLC are the participants from UK. The letters of approval from the UK DNA confirming participation of N.serve and Johnson Matthey were provided. Hence CAR1 was closed.

The host party for this project is Republic of Korea. Republic of Korea is a Party to the Kyoto Protocol and has ratified the Kyoto protocol on 8 November 2002 and has appointed a DNA. No Letter of Approval was provided and hence, CAR2 was raised. The Letter of Approval no.2007/6 was provided, hence CAR2 was closed.

CAR3 was raised as the letter on the modalities of communication was not provided, the letter detailing modalities of communication between the project participants and the UNFCCC is essential for completing the request for registration for the project. The Modalities of Communication were provided and hence CAR3 was closed.

3.2 Baseline Selection and Additionality

The methodology AM0034 Version 02 requires the use of the additionality tool Version 3 and the baseline scenario selection from AM0028 Version 04.1. Both have been applied in the PDD.

According to the baseline methodology, 5 baseline alternatives have been identified in the PDD, they are:

- 1) Status quo: The continuation of the current situation, without installing any N₂O abatement technology in the plant
- 2) Switch to alternative production method not involving ammonia oxidation process
- 3) Alternative use of N₂O such as:
 - a) recycling of N₂O as feedstock for the plant;
 - b) The use of N₂O for external purposes.
- 4) Installation of a Non-Selective Catalytic Reduction (NSCR) De NO_x -unit
- 5) Installation of an N₂O abatement or reduction technology
 - a) Primary or tertiary measures to prevent the formation or reduce N₂O
 - b) A secondary facility to reduce N₂O (proposed project activity without CDM registration)

As discussed in the methodology, the above options for the identification and description of baseline scenario are analysed in the PDD.

Installation of a N₂O abatement or reduction technology using primary or tertiary measures to prevent the formation or reduce N₂O was discussed as an baseline scenario alternative, further to this, baseline alternatives 2), 3) a) and b) as well as 4) were excluded from further assessment as these are technically not feasible. The baseline scenario regarding installation of N₂O abatement or reduction technology using primary or tertiary measures to prevent the formation or reduce N₂O was not discussed and analyzed in version 1 of the PDD, hence CAR6 was raised.

The rephrased PDD, version 2, discusses that primary abatement technology is not proven and has only shown a very limited abatement efficiency compared to secondary and tertiary measures. Also, none of the N₂O destruction facilities (baseline scenario alternative 5) a) and b)) are expected to generate any financial or economic benefits other than CDM related income.

The reasoning that any plant operator would not install the less proven abatement technology on a voluntary basis without the incentive of any regulatory (emissions caps) or financial benefits, which also has technical/operational problems was accepted.

Through techno-economic and regulatory analysis, it is proved that the continuation of the current situation is the most likely baseline scenario.

It was confirmed with supporting documents that modern commercial nitric acid processes are based on the catalytic oxidation of ammonia over a platinum catalyst. There is no method to produce nitric acid without involving ammonia oxidation. Other options like NSCR DeNO_x, recycling and the proposed project activity without being registered as a CDM project seem in the absence of regulation too expensive and lack financial incentives. Besides, barriers due to prevailing practices exist due to the fact that the installation of N₂O catalytic abatement technology is not common industrial practices in Korea except for registering for CDM projects.

In the discussion on the additionality of the project activity, simple cost analysis was used for investment evaluation since the proposed project activity generates no income other than CDM revenue, NIR7 was raised. Through NIR 7 project proponents were requested to provide details of the total investment and operating costs and the simple cost analysis. The copies of the relevant sections of the contract between N.serve, Dongbu and Johnson Matthey were provided. The catalyst is leased against a share of the CERs. A copy of the excerpts from the comparable projects at Haifa Chemicals Ltd. N3 plant and Fertilisers & Chemicals in Israel was provided as proof of the lease costs of the N₂O abatement catalyst. This was accepted as the costs are not likely to vary much from the other projects being implemented by the project participant in different plants around the same time.

As a conclusion, the proposed project activity requires a substantial investment for installation of the catalyst, AMS system and for operation and maintenance in comparison to the status quo which is in accordance with all regulations and thus needs no additional investment. There are no similar project activities in the region (except CDM projects) which have used N₂O abatement technologies.

Hence the project activity is additional in accordance with the "Tool for demonstration and assessment of Additionality (Version 3).

3.3 Application of Baseline Methodology and Calculation of Emission Factors

The project activity is applying approved methodology AM0034 Version 02 which contains several applicability criteria.

NIR5 was raised to gather further information on the following:

- a) Korean regulations for NO_x abatement; any specific NO_x emission limit of 200ppmv and project's compliance with the Korean regulations
- b) Likelihood of a change in the regulations in near future

A copy of the page showing emission standards for NO_x was checked. It was confirmed that there is a regulatory limit of 200 ppmv for emission of NO_x in the host country. The current regulatory level of 200 ppmv in Korea is quite strict and is not likely to change in at least the first crediting period of implementation of the project activity. Therefore, it is considered unlikely that this regulatory level will change in the near future in Korea. The change in the regulatory limits and its effect on the project activity would need to be reassessed in the subsequent crediting periods.

Currently there is no N₂O abatement technology installed in the project which was commissioned in 1992. Excerpts from the operation manual of the plant were provided for validation, it was confirmed that the existing design production capacity for the project activity is 90,000 tonnes of 100% concentrated nitric acid per year (based on 300 operating days per year and a daily nameplate capacity of 300 tonnes of nitric acid). Installation of the secondary catalyst will not lead to increase in NO_x emissions and it will not lead to change in nitric acid production either.

During the validation process, N.serve and SGS agreed that review of the permitted conditions and baseline emissions will be left to the verifying DOE. Hence no findings were further discussed regarding baseline emissions calculations (CAR8 & CAR9 were closed subject to this decision).

The approved consolidated methodology AM0034 requires the use of the European Norm EN14181 (2004) "*Stationary source emissions - Quality assurance of automated measuring systems*"¹ as a guidance for installing and operating the Automated Monitoring System (AMS) in the nitric acid plants for the monitoring of N₂O emissions. The PDD states that the plant will apply EN14181 standard to the AMS systems.

CAR 10 was raised to check for the following requirements as below:

- certificates for suitability of analyzer for N₂O monitoring under QAL1 of EN1481 and ISO 14956
- certification on successful completion of testing series
- certificate of testing and certification of flow meter
- calibration certificates for analyzer and flow meter
- QAL2 specific reference measurements using SRM methods per EN1481 and results of standard reference measurements
- Analytical report establishing that gas is pure N₂ gas with a certified accuracy of +/-2%
- Analytical report for span calibration
- Date time, name, confirmation that flow meter probe and thermocouple were taken out of the stack, general description of the condition of the probes, proper reinstallation confirmation

The final QAL 2 report was (Report no. EZ/07/2023 dated 31/08/2007) mentions that at the time of preparation of the report there was no analyzer available with the specification report which covers the procedures of the European standard EN1481 (no QAL1 report available). However the report further states that the measurement programme (QAL2) covered the most important QAL1 and QAL2 issues for the used N₂O analyzers. The main conclusions as summarized in the report mentioned that ADC MGA3000 emission measurement analyzer and the flow meter Foxboro IVM30 comply with the QAL1 and QAL2 requirements of the European standard EN14181, the QA/QC system of the plant complies roughly with the demands of EN14181 QAL3.

The report also concluded that overall, the equipment (CEMS) used to monitor the N₂O concentration and flow rate of the flue gases complies with the standard.

According to AM0034 Version 02, calculation of leakage is not required for the proposed project.

The application of formulas used for emission reduction calculations in the PDD is in accordance with the methodology. Data and parameters provided in the PDD section B.6.2. will be reviewed by a verifying DOE.

It was checked that the project activity is not a common practice in the host country. The other plants implementing N₂O abatement technologies are driven solely by the incentives from the CDM. For example other Korean projects at Huchems and Hanwha (both using AM0028).

In the EU there are a number of plants that have been operating with N₂O abatement catalysts for some time (up to three years) but all of these were either

- a) driven by CO₂ taxation in France and Norway; or
- b) testing ground for the nitric acid producer's own development of N₂O abatement catalysts (namely Yara and BASF); or
- c) preparation for IPPC BAT recommendations and/or forthcoming EU directive limiting N₂O emissions.

The project is expected to generate 240651tCO₂e annually, and 2406510 CO₂e during the 10 year fixed crediting period.

¹ This standard describes the quality assurance procedures needed to assure that an Automated Measuring System (AMS) installed to measure emissions to air are capable of meeting the uncertainty requirements on measured values given by legislation, e.g. EU Directives, or national legislation, and more generally by competent authorities.

3.4 *Application of Monitoring Methodology and Monitoring Plan*

The project is applying the approved monitoring methodology AM0034 Version 02. In accordance with this methodology, gauze supplier and gauze composition for historical campaigns and for baseline campaign have been discussed. NIR11 was raised to confirm the monitoring personnel's training for additional data handling as discussed in section B.7.2 of the PDD. The client provided the documents containing information about the description of training and instructions undertaken for Dongbu staff for data acquisition, handling and transfer. NIR 11 was closed.

As discussed above in section 3.2, the onsite assessment addressed the measurement systems of the plant and it was concluded that the measurement equipments and the QA/QC systems meet the requirements of EN14181. All monitoring procedures in the plant are also conducted in accordance with the well established ISO9001/14001 standards, which is not required by the methodology nevertheless will strengthen the QA/QC systems. As a conclusion, the monitoring plan of the project was therefore found acceptable.

In accordance with decision from EB31 Paragraph 28 that "either validating or verifying DOE could undertake the task of determination of the permitted operating conditions for project activities using approved methodology AM0034", SGS and the project participants agree that this part of work is not in the scope of validation. Hence AFR_{max} , $AIFR_{max}$, OT_{normal} , OP_{normal} , CL_{normal} and related parameters that based on these permitted conditions are not reviewed during this validation process.

3.5 *Project Design*

From the design of the project, it is expected that the project would involve transfer of state of the art equipment to the Host Party. Project design reflects good practices assuming proper installation and maintenance. On site assessment showed that staff is capable and has been trained. The project duration depends on maintenance and replacement of the secondary catalyst but is expected to run longer than the crediting period.

NIR 4a,b,c were raised regarding the following editorial changes in the PDD:

- Name of the host country has to be revised
- Johnson Matthey Plc. is mentioned as a project participant but not mentioned in Annex 1 of the PDD.
- The starting date for crediting period is 05 August 2007 however table indicating annual estimation of emission reductions in tonnes of CO₂e mentions July to December

PDD version 2 addresses the above issues. The crediting period will start on 16/01/2008. Hence NIR4 was closed. The CDM PDD format version 03.1 is used and the information provided in is in accordance with the guidelines for completion of a PDD.

It was further stated in the PDD that "In addition, the crediting period shall commence after the date of registration or the completion of the baseline campaign of the project, whatever occurs later."

3.6 *Environmental Impacts*

The Project includes installation of catalyst in the existing burners. Negative environmental impacts are therefore expected to be minimal. It was confirmed that no EIA is required for the implementation of the project activity.

3.7 *Local Stakeholder Comments*

The project participants performed local stakeholders' consultation through newspaper advertisement inviting comments from public and stakeholders, the publication has been made on Kyungsang Daily Newspaper of Feb. 28th, 2007. Evidence was provided and it was confirmed that the process took place as described and no significant comments were received.

4. Comments by Parties, Stakeholders and NGOs

In accordance with sub-paragraphs 40 (b) and (c) of the CDM modalities and procedures, the project design document of a proposed CDM project activity shall be made publicly available and the DOE shall invite comments on the validation requirements from Parties, stakeholders and UNFCCC accredited non-governmental organizations and make them publicly available. This chapter describes this process for this project.

4.1 Description of How and When the PDD was Made Publicly Available

The PDD and the monitoring plan for this project were made available on the SGS website during 17/04/2007 till 16/05/2007 <http://www.sgsqualitynetwork.com/tradeassurance/ccp/projects/project.php?id=251> . Since the validation process started when the international stakeholder consultation period was still underway, NIR3 was raised to check if any comments arose by the close of the stakeholder consultation period. No comments were received. Hence NIR3 was closed.

4.2 Compilation of all Comments Received

No comments have been received.

4.3 Explanation of How Comments Have Been Taken into Account

No comments have been received.

5. Validation Opinion

SGS has performed a validation of the 'Project for the catalytic reduction of N₂O emissions with a secondary catalyst inside the ammonia reactor of the nitric acid plant at Dongbu Hannong Chemicals Ltd., Ulsan, Korea ("Dongbu")'. The Validation was performed on the basis of the UNFCCC criteria and host country criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

Using a risk based approach, the review of the project design documentation and the subsequent follow-up interviews have provided SGS with sufficient evidence to determine the fulfilment of the stated criteria. In our opinion, the project meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria. The project will hence be recommended by SGS for registration with the UNFCCC.

SGS has received confirmation by the host Party that the project activity assists it in achieving sustainable development.

By the installation of N₂O abatement technology, the project results in reductions of greenhouse gas emissions that are real, measurable and give long-term benefits to the mitigation of climate change. A review of the investment analysis demonstrates that the proposed project activity is not a likely baseline scenario. Emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity. If the project is implemented as designed, the project is likely to achieve the estimated amount of emission reductions.

The validation is based on the information made available to SGS and the engagement conditions detailed in the report. The validation has been performed using a risk based approach as described above. The only purpose of this report is its use during the registration process as part of the CDM project cycle. Hence SGS can not be held liable by any party for decisions made or not made based on the validation opinion, which will go beyond that purpose.

The DOE declares herewith that in undertaking the validation of this proposed CDM project activity it has no financial interest related to the proposed CDM project activity and that undertaking such a validation does not constitute a conflict of interest which is incompatible with the role of a DOE under the CDM.

6. List of Persons Interviewed

Date	Name	Position	Short description of subject discussed
June-September, 2007	Christopher Brandt	Managing director N Serve	<i>Close out findings</i>
June-September, 2007	Albrecht Von Ruffer	Managing director N Serve	<i>Close out findings</i>

7. Document References

Category 1 Documents (documents provided by the Client that relate directly to the GHG components of the project, (i.e. the CDM Project Design Document, confirmation by the host Party on contribution to sustainable development and written approval of voluntary participation from the designated national authority):

- /1/ PDD, the following versions have been provided:
 - Version 1 dated 5th April 2007 and made publicly available
 - Version 2 dated 7th September 2007 and submitted for registration request
- /2/ AM0034 Version 02
- /3/ UK LoA for N.serve Environmental Services GmbH issued on 28th September 2007
- /4/ UK LoA for Johnson Matthey PLC issued on 16th October 2007
- /5/ Republic of Korea LoA issued on 21st September 2007

Category 2 Documents (background documents used to check project assumptions and confirm the validity of information given in the Category 1 documents and in validation interviews):

- /6/ Excerpts from Operating Manual for Dongbu plant
- /7/ Simple Cost Analysis Form for Dongbu plant
- /8/ Johnson Matthey Precious Metals Division Export Invoice
- /9/ Johnson Matthey Public Ltd. and F& C Contract
- /10/ QAL 2 report (Report no. EZ/07/2023 dated 31/08/2007)

A.1 Annex 1: Local Assessment

What to check	Answer	Objective Evidence / Source of information / Persons interviewed
Can you confirm from the documents available that there is a confirmation by Ministry of Environment that no Environmental Impact Assessment is required for the project	The project in Dongbu does not fall into these categories and thus an EIA is not required. N ₂ O abatement catalyst will be leased from an overseas supplier. The catalyst will be replaced from time to time and the spent catalyst returned to the supplier for recycling	Ministry of Environment
Can you confirm the local stakeholder process took place as described in the PDD	The local stakeholder consultation process was undertaken.	Relevant sections of the newspaper advertisement and photographs of the stakeholder consultation are attached in the PDD
Can you confirm from the documents and by talking to some of the persons mentioned in the PDD that no significant comments were received on the project itself.	Reviewed excel sheet with the telephone numbers of the persons who were contacted during the stakeholder's comments collection process.	No significant comments were received on the project

A.2 Annex 2: Validation Protocol

Table 1 Participation Requirements for Clean Development Mechanism (CDM) Project Activities (Ref PDD, Letters of Approval and UNFCCC website)

REQUIREMENT	REFERENCE	Comments	CONCLUSION
All Parties (listed in Section A3 of the PDD) have ratified the Kyoto protocol and are allowed to participate in CDM projects	Marrakech Accords, CDM Modalities §30	<p>Republic of Korea is a Party to the Kyoto Protocol and has ratified the Kyoto protocol on 08 November 2002</p> <p>Ref. http://maindb.unfccc.int/public/country.pl?country=KR</p> <p>Germany has ratified the KP on 31 May 2002, refer to http://maindb.unfccc.int/public/country.pl?country=DE</p>	OK
The project shall assist Parties included in Annex I in achieving compliance with part of their emission reduction commitment under Art. 3 and be entered into voluntarily.	Marrakech Accords, CDM Modalities §29 and §30	<p>Germany is mentioned as a 'Party'.</p> <p>No letter of approval from the German DNA is available at this stage, Please provide LoA. (LoA provided from UK DNA, PDD changed)</p>	CAR1 OK
The project shall assist non-Annex I Parties in achieving sustainable development and shall have obtained confirmation by the host country thereof, and be entered into voluntarily	<p>Marrakech Accords, CDM Modalities §29 and §30</p> <p>Kyoto Protocol Art. 12.2, Marrakech Accords, CDM Modalities §40a</p>	<p>No letter of Approval is available for the Republic of Korea's DNA</p> <p>Please provide letter of Approval from the Republic of Korea's DNA (Letter of approval provided)</p>	CAR2 OK
Parties, stakeholders and UNFCCC accredited NGOs shall have been invited to comment on the validation requirements for minimum 30 days, and the project	Marrakech Accords, CDM Modalities, §40	The project is listed on the website during 17/04/2007 till 16/05/2007	NIR3

design document and comments have been made publicly available		http://www.sgsqualitynetwork.com/tradeassurance/ccp/projects/project.php?id=251 (No comments received)	OK
The project design document shall be in conformance with the UNFCCC CDM-PDD format	Marrakech Accords, CDM Modalities, Appendix B, EB Decisions	PDD Version 03.1- in effect as of 28 th July 2006 has been used	OK
The project participants shall submit a letter on the modalities of communication (MoC) before submitting a request for registration	EB-09 F_CDM_REG form	Please provide letter on the modalities of communication (MoC letter provided)	CAR3 OK
For AR projects, the host country shall have issued a communication providing a single definition of minimum tree cover, minimum land area value and minimum tree height. Has such a letter been issued and are the definitions consistently applied throughout the PDD?	n/a	n/a	n/a

Table 2 PDD

CHECKLIST QUESTION	Ref. ID	MoV*	COMMENTS	Draft Concl	Final Concl
A. General Description of Project Activity					
A.1. Project Title					
A.1.1. Does the used project title clearly enable to identify the unique CDM activity?	A.1 PDD	DR	The project title is clear	OK	OK
A.1.2. Are there an indication of a revision number and the date of the revision?	A.1 PDD	DR	Version and date of completion of the document are mentioned	OK	OK
A.1.3. Is this in consistency with the time line of the project's	A.1	DR	Yes, the start date of the crediting period is	OK	OK

CHECKLIST QUESTION	Ref. ID	MoV*	COMMENTS	Draft Concl	Final Concl
history?	PDD		06/01/2008		
A.2. Description of the project activity					
A.2.1. Is the description delivering a transparent overview of the project activities?	A.2 PDD	DR	The discussion is clear The project activity will significantly reduce N2O emissions through the installation of a new palletized catalyst, hence leading to technology/skill transfer to non-annex I Parties.	OK	OK
A.2.2. Is all information provided in compliance with actual situation or planning?	PDD	SV	The dates mentioned in the PDD and the project documentation are consistent	OK	OK
A.2.3. Is all information provided consistent with details provided in further chapters of the PDD?	PDD	SV	OK, except baseline determination	OK	OK
A.3. Project Participants					
A.3.1. Is the table required for the indication of project participants correctly applied?	A.3 PDD	DR	Name of the host country is to be revised (Republic of Korea) Revised	NIR4a	OK
A.3.2. Is all information provided in consistency with details provided by further chapters of the PDD (in particular annex 1)?	A.3 PDD	DR	Johnson Matthey Plc. Is mentioned as a project participant. Please provide contact details of Johnson Matthey in the Annex.1 (Letter Provided)	NIR4b	OK
A.3.3. Does the information provided on the location of the project activity allow for a clear identification of the site(s)?	A.4.1 .1 PDD	DR	Name of the host country is to be revised (Republic of Korea) (Revised)	NIR4a	OK

CHECKLIST QUESTION	Ref. ID	MoV*	COMMENTS	Draft Concl	Final Concl
A.3.4. Do the project participants possess ownership or licenses which will allow the implementation of the project at that site / those sites?	A.4.4 PDD	DR	The project is not a Greenfield project. Dongbu's Nitric Acid Plant was commissioned in 1992	OK	OK
A.3.5. Does the project design engineering reflect current good practices?	A.4.3	DR	N2O abatement technology, as used by the project is a novice to the nitric acid plants in both Annex I and non-Annex I nations The CDM project activities should lead to the transfer of environmentally safe and sound technologies and know-how.	OK	OK
A.3.6. Does the description of the technology to be applied provide sufficient and transparent input to evaluate its impact on the greenhouse gas balance and is the explanation how the project will reduce greenhouse gas emission transparent and suitable?	A.4.3 PDD	DR	The secondary catalyst installed in the Nitric Acid plant would reduce the current N2O emissions substantially.	OK	OK
A.3.7. Is all information provided in compliance with actual situation or planning as available by the project participants?			Checked the permits for operation of the project	OK	OK
A.3.8. Does the project use state of the art technology or would the technology result in a significantly better performance than any commonly used technologies in the host country?	A.2 PDD	DR	The technology is not a common practice in either Annex I or non-Annex I countries	OK	OK
A.3.9. Is the project technology likely to be substituted by other or more efficient technologies within the project period?	PDD	DR	The current technologies reduce N2O emissions by 80-90%. The project is not likely to replace the current technology by one which leads to more reduction of emissions during the crediting period	OK	OK
A.3.10. Does the project require extensive initial training and maintenance efforts in order to work as presumed during the project period?	B.7.2	DR	N2O monitoring system requires extensive training on operation and maintenance	OK	OK

CHECKLIST QUESTION	Ref. ID	MoV*	COMMENTS	Draft Concl	Final Concl
			PDD mentions that calibration and service intervals are also being carried out by staff from the instrumentation department according to vendor's requirement and EN1481 and ENISO		
A.3.11. Is the table required for the indication of projected emission reductions correctly applied?	A.4.4 PDD	DR	The start date for crediting period is 05 August 2007 however table indicating annual estimation of emission reductions in tonnes of CO ₂ e mentions July to December, please revise table Table revised, the start date of the crediting period is January 16, 2008 Projected Baseline N ₂ O emission factor (EF _{BL}) of 11.23kg/tHNO ₃ (tbc) (baseline EF not in the validation scope)	NIR4c Obs	OK OK
A.4. Public Funding					
A.4.1. Does the information on public funding provided conform with the actual situation or planning as presented by the project participants?	A.4.5 PDD	DR	The project does not use public funding	OK	OK
A.4.2. Is all information provided consist with details provided by further chapters of the PDD (in particular annex 2)?	Annex 2 PDD	DR	No public funding is involved	OK	OK
B. Baseline and Monitoring Methodology					
B.1. Choice and Applicability					
B.1.1. Is the baseline methodology previously approved by the CDM Methodology Panel?	B.1 PDD	DR	The project uses approved baseline and monitoring methodology AM0034 (version 2)	OK	OK

CHECKLIST QUESTION	Ref. ID	MoV*	COMMENTS	Draft Concl	Final Concl
	unfc cc.int				
B.1.2. Is the choice of the methodology correctly justified by the PDD and is the project in conformance with all applicability criteria of the applied methodology?	PDD AM0 034	DR	<ol style="list-style-type: none"> existing production facility installation date (start date before December 2005) Checked, start date is before December 2005 Existing production capacity measured in tonnes of Nitric Acid per year (90,000 tHNO3/year, ref A.4.4) Check if there is any destruction/abatement facility or equipment before the installation of secondary catalyst Regulations or incentives to reduce levels of N2O emissions from Nitric Acid plants in Republic of Korea The project does not lead to an increase in NOx emissions There is no NSCR DeNOx abatement unit installed in the plant (before the project start) The installation of secondary abatement catalyst does not lead to any direct or indirect GHG emissions within the project boundary Continuous real time measurements of N2O concentration and total gas volume flow can be carried out i.e. AMS commissioned at the plant in January 2007 is collecting baseline data measuring 	NIR8	OK

CHECKLIST QUESTION	Ref. ID	MoV*	COMMENTS	Draft Concl	Final Concl
			concentration and total gas volume flow		
B.1.3. Are all emission sources and gasses related to the baseline scenario, project scenario and leakage clearly identified and described in a complete manner?	B.3 PDD	DR	Only N2O emissions are considered as CO2and CH4 emissions do not occur in the process	OK	OK
B.1.4. In case of grid connected electricity projects: Is the relevant grid correctly identified in accordance with EB guidance and the underlying methodology?	n/a	n/a	n/a	n/a	n/a
B.1.5. Are the project's spatial boundaries (geographical) and the project's system boundaries (components and facilities used to mitigate GHGs) clearly defined?	B.3 PDD	DR	A schematic flow chart is available, it includes all facilities within the project boundary	OK	OK
B.2. Identification of the Baseline Scenario					
B.2.1. Does the PDD discuss the identification of the most likely baseline scenario? Does the PDD follow the steps to determine the baseline scenario required by the methodology and is the application of the methodology and the discussion and determination of the chosen baseline transparent?	B.4 PDD AM0 0028	DR	Korean regulations for NOx abatement; any specific NOx emission limit of 200ppmv and compliance with the Korean regulations Likelihood of a change in the regulations (Checked local regulations)	NIR5	OK
			The baseline scenario 5a) i.e. installation of N2O abatement or reduction technology using primary or tertiary measures to prevent the formation or reduce N2O has not been discussed (Discussed in the version 2 of the PDD)	CAR6	OK
B.2.2. Does the selected baseline represent the most likely scenario among other possible and/or discussed scenarios?	PDD AM0 028	DR	<i>Pending closure of CAR6</i> (CAR 6 closed)	Pending	OK

CHECKLIST QUESTION	Ref. ID	MoV*	COMMENTS	Draft Concl	Final Concl
B.3. Additionality					
B.3.1. Does the PDD clearly demonstrate the additionality using the approach as given by the methodology and by following all the required steps?			Tbc if installation of secondary catalyst has side effects on efficiency/performance/output of the Nitric acid, is it positive (tbc-expert) Pls. provide details of the total investment and operating costs, simple cost analysis (Relevant docs. provided as discussed in the findings and the main report)	Obs NIR7	OK OK
B.3.2. In case of using the additionality tool: Are all steps followed in a transparent manner?	PDD Sec B.5 AM0 034	DR	Pending closure of NIR 7(above) and obs. In section B.4.1 (above) (NIR 7 Closed)	Pending	OK
B.3.3. Is the discussion on additionality and the evidence provided consistent with the starting date of the project	PDD Sec B.5 AM0 034	DR	Timelines regarding total investment and operating costs to be checked	Obs	OK
B.3.4. Is the discussion on additionality consistent with the identification all potential realistic and credible baseline scenarios	PDD Sec B.4, B.5 AM0 034 & AM0 028	DR	Sec.B.4 (PDD), Pt. 5)a) Primary and tertiary measures to prevent formation or reduce N2O were not discussed in the discussion on identification of potential realistic and credible baseline scenarios- to be included in the additionality argument if these are credible	Obs.	OK

CHECKLIST QUESTION	Ref. ID	MoV*	COMMENTS	Draft Concl	Final Concl
B.3.5. If an investment analysis has been used, has it been shown that the proposed project activity is economically or financially less attractive than at least one other alternative without the revenue from the sale of CERs?	PDD Sec B.5 AM0 034	DR	The project activity involves substantial investment than other discussed options	OK	OK
B.3.6. If a barrier analysis has been used, has it been shown that the proposed project activity faces barriers that prevent the implementation of this type of proposed project activity but would not have prevented the implementation of at least one of the alternatives?	Sec. B.4 PDD	DR	The project is likely to continue its operations without N2O abatement. As discussed in the PDD continued plant operations without change would no have any barriers	OK	OK
B.3.7. Has it been shown that the project is not common practice?	Sec. B.4 PDD	DR	The installation is not a common practice in Republic of Korea	OK	OK
B.3.8. Is it demonstrated/justified that the project activity itself is not a likely baseline scenario	Sec. B.5 PDD	DR	Continued plant operation without installation of the N2O abatement technology is the likely baseline scenario	OK	OK
B.4. Application of the baseline methodology					
B.4.1. Has the approved methodology been applied correctly for determining baseline emissions ?	Sec. B.6 PDD	DR	Please provide datasets for determining the "permitted range" for oxidation temperature and pressure, ammonia gas flow rate and ammonia to air flow ratio for the previous 5 campaigns tbc whether the ranges are within the specifications of the facility (not in the scope of validation)	CAR8a CAR8b	OK OK
B.4.2. Has the approved methodology been applied correctly for determining project emissions ?	Sec. B.6 PDD	DR	Please provide datasets for determination of N2O concentration and gas volume flow Spreadsheets determining N2O emission	CAR8c	OK

CHECKLIST QUESTION	Ref. ID	MoV*	COMMENTS	Draft Concl	Final Concl
			factor per tonne of nitric acid produced in the baseline Provide information on Campaign length (historic) and campaign length (baseline) Data on statistical tests comparing baseline campaign with normal operating conditions (not in the scope of validation)		
B.4.3. Has the approved methodology been applied correctly for determining leakage ?	Sec. B.6 PDD ACM 0003 4	DR	No leakage calculation is required	OK	OK
B.4.4. Are uncertainties in the GHG emissions estimates properly addressed in the documentation?	Sec. B.6 PDD	DR	Extreme values and error readings are automatically eliminated through AMS Statistical approach is applied to eliminate extremes and a conservative approach is adopted	OK	OK
B.5. Ex-ante data and parameters used					
B.5.1. Are the data provided in compliance with the methodology?	Sec. B.6.2	DR	Please provide details of the calculation for parameters listed in section B.6.2 (available at the time of validation) (not in the scope of validation)	pending closure of CAR8	OK
B.5.2. Is the vintage of the baseline data correct?	Sec. B.6.2 PDD	DR	Please provide details of the calculation for parameters listed in section B.6.2 (available at the time of validation) (not in the scope of validation)	pending closure of CAR8	OK

CHECKLIST QUESTION	Ref. ID	MoV*	COMMENTS	Draft Concl	Final Concl
B.6. Calculation of Emissions Reductions					
B.6.1. Has the approved methodology been applied correctly for determining emission reductions ?	Sec. B.6.3 PDD	DR	Databases to be checked using N.serve database management system (not in the scope of validation)	CAR9	OK
B.6.2. Are the emission reduction calculations documented in a complete and transparent manner?	Sec. B.6.3 PDD	DR	Databases to be checked using N.serve database management system (not in the scope of validation)	Pending closure of CAR9	OK
B.6.3. Is the calculation of the emission reduction correct?	Sec. 6.4 PDD	DR	Pending closure of above CARs	Pending	OK
B.7. Monitoring Methodology					
B.7.1. Does the monitoring methodology provide a consistent approach in the context of all parameter to be monitored and further information provided by the PDD?	Sec. B.7.1 & 7.2 PDD	DR	The approach used in the PDD is in accordance with AM0034	OK	OK
B.8. Data and parameters monitored					
B.8.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for estimation or measuring the emission reductions within the project boundary during the crediting period?	B.7.1 PDD	DR	The procedure and parameters involved in collection and archiving of data is detailed in the monitoring Plan	OK	OK
B.8.2. Is the information given for each monitoring variable by the presented table sufficient to ensure the verification of a proper implementation of the monitoring plan?	Sec. 7.2 PDD	DR	Please provide certificates for suitability of analyzer for N2O monitoring under QAL1 of EN1481 and ISO 14956	CAR10	OK

CHECKLIST QUESTION	Ref. ID	MoV*	COMMENTS	Draft Concl	Final Concl
	Pg.4 9 para 1		<p>Certification on successful completion of testing series</p> <p>Certificate of testing and certification of flow meter</p> <p>Calibration certificates for analyzer and flow meter</p> <p>QAL2 specific reference measurements using SRM methods per EN1481, results of standard reference measurements1</p> <p>Analytical report establishing that gas is pure N2 gas with a certified accuracy of +/-2%</p> <p>Analytical report for span calibration</p> <p>Date time, name, confirmation that flow meter probe and thermocouple were taken out of the stack, general description of the condition of the probes, proper reinstallation confirmation</p> <p>(Checked, QAL2 report)</p>		
B.8.3. Is the monitoring approach in line with current good practice, i.e. will it deliver data in a reliable and reasonably acceptable accuracy?	B.7 PDD	DR	The monitoring approach is in line with latest and most appropriate monitoring systems in the industry	OK	OK
B.8.4. Are all formulae used to determine project emission clearly indicated and in compliance with the monitoring methodology.	B.6 PDD	DR	Yes, the formulae used are in accordance with AM0034	OK	OK
B.9. Quality Control (QC) and Quality Assurance (QA) Procedures					
B.9.1. Is the selection of data undergoing quality control and quality assurance procedures complete?	Sec.	DR	QA/QC procedures are sufficiently described	OK	OK

CHECKLIST QUESTION	Ref. ID	MoV*	COMMENTS	Draft Concl	Final Concl
	B.7.1 PDD		ISO 9001/14001 procedures are applied and are documented		
B.9.2. Is the belonging determination of uncertainty levels done correctly for each ID in a correct and reliable manner?	Sec. B.7.1 PDD	DR	Yes, procedures are sufficiently described for each parameter	OK	OK
B.9.3. Are quality control procedures and quality assurance procedures sufficiently described to ensure the delivery of high quality data?	Sec7 .1 PDD	DR	Yes, these procedures if applied as per the description in the PDD will ensure high quality data	OK	OK
B.9.4. Is it ensured that data will be bound to national or internal reference standards?	Sec B.7.1 PDD	DR	Yes, these procedures are in accordance with AM0034/EN14181 standards	OK	OK
B.10. Operational and management structure					
B.10.1. Is the authority and responsibility of project management clearly described?	Sec. B.7.2 PDD	DR	Project management is clearly described	OK	OK
B.10.2. Is the authority and responsibility for registration, monitoring, measurement and reporting clearly described?	Sec. B.7.2 PDD	DR	Dongbu staff and the instruments department is responsible for registration, monitoring, measurement and reporting of data	OK	OK
B.10.3. Are procedures identified for training of monitoring personnel?	Sec. B.7.2 PDD	DR	Monitoring personnel's trainings for additional data handling to be confirmed (Documents checked)	NIR11	OK
B.11. Monitoring Plan (Annex 4)					
B.11.1. Is the monitoring plan developed in a project specific manner clearly addressing the unique features of the CDM activity?	Anne x 4	DR	EN14181 standard is followed AMS is installed for maintaining quality of data	OK	OK

CHECKLIST QUESTION	Ref. ID	MoV*	COMMENTS	Draft Concl	Final Concl
	PDD		collection		
B.11.2. Does the monitoring plan completely describes all measures to be implemented for monitoring all parameter required, including measures to be implemented for ensuring data quality?	Anne x 4 PDD	DR	EN14181 standard is followed AMS is installed for maintaining quality of data collection	OK	OK
B.11.3. Does the monitoring plan provide information on monitoring equipment and respective positioning in order to safeguard a proper installation?					
B.11.4. Are procedures identified for calibration of monitoring equipment?	Anne x 4 PDD	DR	EN14181 standard is followed AMS is installed for maintaining quality of data collection	OK	OK
B.11.5. Are procedures identified for maintenance of monitoring equipment and installations?	Anne x 4 PDD	DR	EN14181 standard is followed AMS is installed for maintaining quality of data collection	OK	OK
B.12. Baseline details					
B.12.1. Is there any indication of a date when determine the baseline?	Sec. B.8 PDD	DR	05 April 2007	OK	OK
B.12.2. Is this in consistency with the time line of the PDD history?	PDD AM0 0034	DR	Yes	OK	OK
B.12.3. Is all data required provided in a complete manner by annex 3 of the PDD?	anne xure 3, PDD	DR	Excel files to be provided (not in the scope of validation)	pending closure of CAR 9	OK

CHECKLIST QUESTION	Ref. ID	MoV*	COMMENTS	Draft Concl	Final Concl
C. Duration of the Project / Crediting Period					
C.1.1. Are the project's starting date and operational lifetime clearly defined and reasonable?	Sec. C.1P DD	DR	Project starts on 29 th January 2007 operational lifetime is 25 years	OK	OK
C.1.2. Is the assumed crediting time clearly defined and reasonable (renewable crediting period of max 7 years with potential for 2 renewals or fixed crediting period of max. 10 years)?	Sec. C3.1 PDD	DR	10 years fixed crediting period	OK	OK
C.1.3. Does the project's operational lifetime exceed the crediting period	Sec. C PDD	DR	Yes, the crediting period is less than the operational lifetime	OK	OK
D. Environmental Impacts					
D.1.1. Does the project comply with environmental legislation in the host country?	Sec. D PDD	DR	The project complies with the local environmental regulations and has obtained the necessary permissions to operate. The project will not have any adverse environmental impacts.	OK	OK
D.1.2. Has an analysis of the environmental impacts of the project activity been sufficiently described?	Sec. D PDD	DR	No impact envisaged as the secondary catalyst will be replaced and spent catalyst will be returned to the supplier for recycling	OK	OK
D.1.3. Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved?	Sec. D PDD	DR	EIA not required for installation of N2O reduction projects in Korea- as checked on the web	OK	OK
D.1.4. Will the project create any adverse environmental effects?	Sec. D PDD	DR	No adverse impacts envisaged	OK	OK
D.1.5. Are transboundary environmental impacts considered in the analysis?	Sec.	DR	n/a	Ok	OK



CHECKLIST QUESTION	Ref. ID	MoV*	COMMENTS	Draft Concl	Final Concl
	D PDD				
E. Stakeholder Comments					
E.1.1. Have relevant stakeholders been consulted?	Sec E PDD	DR	List provided covers participation of local stakeholders	OK	OK
E.1.2. Have appropriate media been used to invite comments by local stakeholders?	Sec E PDD	DR	Yes, newspaper advertisement, phone and e-mail used	OK	OK
E.1.3. Is the undertaken stakeholder process described in a complete and transparent manner? Is a summary of the stakeholder comments received provided?	Sec E PDD	DR	Yes, summary provided in PDD indicates that there were no outstanding issues/concerns from the local stakeholders	OK	OK
E.1.4. Has due account been taken of any stakeholder comments received?	Sec E PDD	DR	No outstanding issues	OK	OK

A.3 Annex 3: Findings Overview

Each Table below represents a finding from the validation assessment. The findings are numbered consecutively, approximately in the order that they have been identified.

Description of table:

Type	Findings are either New Information Requests (NIR) or Corrective Action Requests (CAR). CARs are items that must be addressed before a project can receive a recommendation for registration. NIRs may lead to the raising of CARs. Observations are included at the end and may or may not be addressed. They are primarily to act as signposts for the verifying DOE.
------	---

Issue Details the content of the finding

Ref refers to the item number in the Validation Protocol

Response Please insert response to finding, starting with the date of entry.

Rows for comments and further response will be appended to the table until the Findings has been addressed to the satisfaction of the Lead Assessor.

Date: 08-05-2007

Raised by: Siddharth Yadav

No.	Type	Issue	Ref
1	CAR	Germany is mentioned as a 'Party'. No letter of approval from the German DNA is available at this stage, Please provide LoA	2
14 May 2007 Germany will not become a Party. Instead, N.serve will request an LoA from the UK DNA and the UK will become a Party next to N.serve's name.			
19 Jun 2007 UK LoA can only be requested once Korean LoA is available.			
Date:19/06/07 Siddharth Yadav [Acceptance and close out] PDD, table A.3 has been revised (dated 21 st May 2007) to reflect changes due to exclusion of Germany as a 'Party', United Kingdom is included as a Party instead. LoAs from UK DNA have been was provided			
Date:16/10/07 Siddharth Yadav [Acceptance and close out] LoA from host country has been provided for Johnson Matthey Plc.			

08-05-2007

Raised by: Siddharth Yadav

No.	Type	Issue	Ref
2	CAR	No letter of Approval is available for the Republic of Korea's DNA, Please provide letter of Approval from the Republic of Korea's DNA	3
Date: 14 May 2007 [Comments] I don't think the <u>Democratic</u> Republic of Korea has ratified the Kyoto Protocol. But we are currently applying for an LoA from the Republic of Korea, where the project is based and will therefore provide this as soon as it is available.			
Date: 15 may 2007 Please revise PDD to mention 'Republic of Korea' instead of 'Korea' and provide LOA from the host country.			
01 June 07 LoA from Republic of Korea will be requested during first week of June and submitted to SGS as soon as it is available.			
19 June 07 Korean LoA has been requested mid June, issuance expected by early/mid July.			
Date:16/09/07 Siddharth Yadav [Acceptance and close out] LoA from host country provided, CAR2 Closed.			

08-05-2007

Raised by: Siddharth Yadav

No.	Type	Issue	Ref
3	CAR	Please provide letter on the modalities of communication	6
<p>01 June 07 The draft ModCom have been provided to JM, Dongbu and UPC. Awaiting their approval and signature before forwarding to SGS.</p> <p>19 Jun 07 ModComs have been signed by all four project participants and copy forwarded to SGS.</p> <p>Date: 20/06/07 Siddharth Yadav [Acceptance and close out] The letter communicating modalities of communication has been provided, CAR 3 closed.</p>			

Date: 08-05-2007

Raised by: Siddharth Yadav

No.	Type	Issue	Ref
4	NIR4a NIR4b NIR4c	<p>Name of the host country is to be revised</p> <p>John Matthey Plc. Is mentioned as a project participant. Please provide contact details of John Matthey in the Annex.1</p> <p>The start date for crediting period is 05 August 2007 however table indicating annual estimation of emission reductions in tonnes of CO2e mentions July to December, please revise table</p>	<p>A3.1, A3.2</p> <p>A.4.10</p>
<p>14 May 2007 a) see comment under CAR2 b) done c) we have changed the start date to 29 January 07 and amended the relevant tables accordingly.</p> <p>Date: 20/06/07 Siddharth Yadav [Acceptance and close out] Correct Host country mentioned (republic of Korea), NIR4a closed Contact details of all the four participants have been mentioned, NIR4b closed Date : 13/09/07 date of the crediting period is now 16 January 2008, NIR4c closed.</p>			

Date: 08-05-2007

Raised by: Siddharth Yadav

No.	Type	Issue	Ref
5	NIR	<p>a) Korean regulations for NOx abatement; any specific NOx emission limit of 200ppmv and compliance with the Korean regulations</p> <p>b) Is there any likelihood of a change in the regulations in near future</p> <p>c) The baseline scenario 5a) i.e installation of N2O abatement or reduction technology using primary or tertiary measures to prevent the formation or reduce N2O has not been discussed</p>	<p>B.3.1 Please refer to AU4</p>
<p>14 May 2007 a) → check for specific reference to NOx regulation with Dongbu b) → get comment from Dongbu c) I do not understand the relevance of this comment in relation to section B.3.1 of the PDD. Please clarify (see also our comment agains CAR6 below)</p> <p>19 Jun 07 a) Dongbu confirmed regulatory limit of 200 ppmv of NOx, awaiting reference to the relevant law/regulation from Dongbu/UPC b) The current regulatory level of 200 ppmv in Korea is quite strict in comparison to for example the regulation in Germany (TA Luft 2002) for nitric acid plants with a limit of 0.2 g/m3, which translates into 200mg/m3 or 393ppmv. Therefore, it is considered unlikely that this regulatory level will change in the near future in Korea.</p> <p>21 June 07 Excerpt ("Permissible Emissions Standards") from the Korean Clean Air Conservation Act, containing the</p>			

relevant NOx limits was sent by email on 21 June 07 to SGS www.moleg.go.kr → ENGLISH → Economic Laws → 52.CLEAN AIR CONSERVATION ACT
Date: 20/06/07 Siddharth Yadav [Acceptance and close out] A copy of the page showing emission standards for NOx was checked. Excerpt from the relevant Korean NOx regulation was checked. The relevant air quality regulations are available at 52.CLEAN AIR CONSERVATION ACT The permissible emission standards are also available at www.moleg.go.kr . NIR 5 Closed

Date: 09-05-2007		Raised by: Siddharth Yadav	
No.	Type	Issue	Ref
6	CAR	The baseline scenario 5a) i.e installation of N2O abatement or reduction technology using primary or tertiary measures to prevent the formation or reduce N2O has not been discussed	B.3.1 Please refer to AU4
14 May 2007 Again, what is the relevance of this in relation to section B.3.1? The wording in section B.4 is almost exactly the same as the wording used in previous projects that have already undergone and completed validation by TÜV Süd (Abocol, Colombia and AEL, South Africa) and SGS NL (F&C and Haifa Chem in Israel). It was determined by the validators in all of these projects that it will not be necessary to compare the proposed project activity with the alternative N2O abatement options (i.e. primary and secondary N2O abatement). Therefore, we would assume that the same conclusion applies to Dongbu and other projects going forward.			
Date: 16/05/2007, Siddharth Yadav Comments: Installation of an N2O abatement or reduction technology a) Primary or tertiary measures to prevent the formation or reduce N2O has been discussed as an Baseline scenario alternative, further to this, baseline alternatives 2), 3) a) and b) as well as 4) have been excluded from further assessment as these are technically not feasible. From this I understand that installation of tertiary measures is a viable option but this is not discussed further.			
22 June 2007 Siddharth Yadav It has been argued and discussed in the PDD that plant operator would not install the abatement technology on a voluntary basis without the incentive of any regulatory (emissions caps) or financial benefits (CERs) was accepted. This was also checked through internet that no information existed regarding installation of such abatement technology in the host country. Hence CAR6 was closed			

Date: 09-05-2007

Raised by: Siddharth Yadav

No.	Type	Issue	Ref
7	NIR	Pls. provide details of the total investment and operating costs, simple cost analysis	B.4.1

01 June 2007

Below the cash flow calculation of the simple cost analysis assuming no income in the absence of CDM registration.

Year	1	2	3	4	5	6	7	8	9	10
Cost of abatement	-€ 235,000	-€ 135,000	-€ 135,000	-€ 135,000	-€ 135,000	-€ 135,000	-€ 135,000	-€ 135,000	-€ 135,000	-€ 135,000
Total Costs	-€ 1,450,000									
Interest	10%									
NPV	-€ 920,426									

Date: 20/06/07

[Acceptance and close out]

Please provide copies of documents/reference documents for authentication of the costs quoted above. NIR7 pending NServe

21 June 07 N.serve

N.serve submitted statement on Simple Cost Analysis for Dongbu on 22 June 07 per email with the following calculation:

Dongbu: Simple Cost Analysis

Items	Amount	Unit
Investment Costs (Non-CDM)	-€ 775,000	Euros, 2007 to 2012
Total CERs	195,805	CERs/year
EBITDA (CER revenues)	€ 7,832,201	Euros, 2007 to 2012
Non-CDM income	€ 0	Euro
NPV (@ 10% interest rate)	€ 3,901,516	Euro

N.serve on July 3 provided copies of the relevant sections of the contract between N.serve, Dongbu and Johnson Matthey. The catalyst is leased against a share of the CERs. Please refer to the contract excerpts from the comparable projects at Haifa Chemicals Ltd. N3 plant (provided to SGS as part of the validation for that particular project) and Fertilisers & Chemicals in Israel (provided to SGS as part of the Dongbu validation) for proof of the lease costs of the N₂O abatement catalyst.

07 Sep 2007: Date: 20/06/07 Siddharth Yadav

[Acceptance and close out]

N.serve provides copies of the F&C – JM contract. The quoted figures are acceptable. Hence NIR7 Closed

Date: 09-05-2007

Raised by: Siddharth Yadav

No.	Type	Issue	Ref
8	CAR8a	Please provide datasets for determining the "permitted range" for oxidation temperature and pressure, ammonia gas flow rate and ammonia to air flow ratio for the previous 5 campaigns	B.5.1
	CAR8b	tbc whether the ranges are within the specifications of the facility	
	CAR8c	Please provide datasets for determination of N ₂ O concentration and gas volume flow	B.5.2
		Spreadsheets determining N ₂ O emission factor per tonne of nitric acid produced in the baseline	
		Please provide information on Campaign length (historic) and campaign length (baseline)	
		Data on statistical tests comparing baseline campaign with normal operating conditions	

01 June 07

a) excel sheets with historic 5 campaign data and with permitted operating range calculation have been provided to SGS on 01 June 07

b) → Dongbu to provide excerpts from plant manuals to show operating range of plant

c) At the moment we are planning to have the project validated and submit it for registration to the CDM EB without the baseline completed. Therefore, data for VSG, NCSG and all other data relevant for the baseline campaign would not be part of the validation but instead be checked by the verifying DOE.

→ historic campaign length to be provided by N.serve

19 Jun 07

b) Plant manuals have been provided by dongbu and forwarded to SGS

c) On 01 June N.serve provided SGS with complete operating data for five historic campaigns and the calculation of the permitted operating range in accordance with AM0034

Date: 20/06/07

[Acceptance and close out] To be confirmed (Pending SGS)	
22 Jun 07 N.serve SGS confirmed via phone today that permitted operating range is part of validation.	
07 Sep 07 N.serve Complete raw data and excel calculation submitted to SGS, including derivation of permitted operating range and calculation of EF_{BL} .	
07 Sep 07 Siddharth Yadav [Acceptance and close out] The raw data formats are not acceptable as the data should be provided in formats which can be checked and replicated by UNFCCC. It was agreed during the validation process that that review of the permitted conditions and baseline emissions will be left to the verifying DOE. Hence no findings were further discussed regarding baseline emissions calculations. (CAR8 & CAR9 were closed)	

Date: 09-05-2007

Raised by: Siddharth Yadav

No.	Type	Issue	Ref
9	CAR	Emission reduction calculations & Databases to be checked using excel sheets N.serve database management system	B.7.1
14 May 2007 See comments against CAR8c above.			
Date: 07 Sept 07 Siddharth Yadav [Acceptance and close out] The raw data formats are not acceptable as the data should be provided in formats which can be checked and replicated by UNFCCC. It was agreed during the validation process that that review of the permitted conditions and baseline emissions will be left to the verifying DOE. Hence no findings were further discussed regarding baseline emissions calculations. (CAR8 & CAR9 were closed)			

Date: 09-05-2007

Raised by: Siddharth Yadav

No.	Type	Issue	Ref
10	CAR	<ul style="list-style-type: none"> Please provide certificates for suitability of analyzer for N₂O monitoring under QAL1 of EN1481 and ISO 14956 certification on successful completion of testing series certificate of testing and certification of flow meter calibration certificates for analyzer and flow meter QAL2 specific reference measurements using SRM methods per EN1481, results of standard reference measurements¹ Analytical report establishing that gas is pure N₂ gas with a certified accuracy of +/-2% Analytical report for span calibration Date time, name, confirmation that flow meter probe and thermocouple were taken out of the stack, general description of the condition of the probes, proper reinstallation confirmation 	B.9.2
14 May 2007 The ADC analyser is currently undergoing the necessary QAL1 testing to achieve certification. As soon as the certificate is available it will be provided. However, at the time of ordering the analyser for Dongbu, only one QAL1 certified analyser was available in the market. More importantly, our projects at Abocol, Haifa Chemicals and F&C also have analysers installed that have not finalised their QAL1 certification. Nevertheless the projects were validated (by TÜV Süd and SGS) because at the time of purchasing no QAL1 certified analyser was available and also because the QAL1 procedures are currently underway. The QAL2 audit was conducted by SGS in March 2007. However, since the analyser was found to be faulty, the QAL2 for the analyser will have to be repeated. We are currently awaiting suggested timing for this from SGS. But since the baseline will not be audited by the validating DOE but by the verifying DOE, the QAL2 results should not be of concern during the validation.			

<p>Date: 20/06/07</p> <p>[Acceptance and close out]</p> <p>OK, QAL2 results not to be checked</p> <p>Certificates for testing and calibration of ADC analyser and flow meter to be provided, Pending N.serve</p>
<p>03 Jul 07 N.serve</p> <p>Provided testing and calibration certificates for systec flow meter to SGS</p> <p>Still outstanding: testing and calibration certificates for ADC analyser</p>
<p>30 Jul 07</p> <p>ADC sent to SGS NL (Dirk Peeters) the calibration and testing certificates for both the second ADC MGA 3000 analyser (the one that replaced the faulty one before the start of the baseline campaign) and for the Systec Flow meter (after it was shortened and recalibrated to fit the stack before the start of the baseline campaign). The QAL2 report is expected before August 3rd, results will be integrated into EFBL calculation to enable SGS UK to conduct the validation including the baseline.</p>
<p>Date: 02/10/07 Siddharth Yadav</p> <p>[Acceptance and close out] The final QAL 2 report was provided on 01/10/2007(Report no. EZ/07/2023 dated 31/08/2007) mentions that at the time of preparation of the report there was no analyzer available with the specification report which covers the procedures of the European standard EN1481 (no QAL1 report available). However the report further states that the measurement programme (QAL2) covered the most important QAL1 and QAL2 issues for the used N2O analyzers. The main conclusions as summarized in the report mentioned that ADC MGA3000emission measurement analyzer and the flow meter Foxboro IVM30comply with the QAL1 and QAL2 requirements of the European standard EN14181, the QA/QC system of the plant complies roughly with the demands of EN14181QAL3.</p> <p>The QAL 2 report concluded that overall, the equipment (CEMS) used to monitor the N2Oconcentration and flow rate of the flue gases complies with the standard.</p> <p>In view of above and the Data and parameters regarding operating conditions and baseline emission factors to be reviewed by a verifying DOE. CAR10 was closed</p>

Date: 09-05-2007

Raised by: Siddharth Yadav

No.	Type	Issue	Ref
11	NIR	Monitoring personnel's trainings for additional data handling to be confirmed	B.11.3
<p>14 May 2007</p> <p>→ ADC to provide summary of training schedule of Dongbu staff.</p> <p>→ N.serve to provide summary of Donbgu training for data handling.</p>			
<p>Date: 20/06/07</p> <p>N.serve provided relevant documents and certificates to SGS</p>			
<p>03 Jul 07</p> <p>[Acceptance and close out] Siddharth Yadav</p> <p>Relevant documents and certificates were checked and it was confirmed that Monitoring personnel has been sufficiently trained to handle and process additional data. Hence NIR 11 was closed.</p>			

Observations:

- A.4.10: Projected Baseline N2O emission factor (EF_{BL}) of 11.23kg/tHNO3 (tbc)
- B.4.3: Timelines regarding total investment and operating costs checked and found OK.
- B.4.1: Confirmed that the installation of secondary catalyst have no side effects on efficiency/performance/output of the Nitric acid
- B.4.4: Sec.B.4(PDD), Pt. 5)a)Primary and tertiary measures to prevent formation or reduce N2O were not discussed in the discussion on identification of potential realistic and credible baseline scenarios- included in the additionality argument and were found credible

A.4 Annex 4: Statements of Competency of Validation Team

Statement of Competence

Name: Dirk Peeters

SGS Affiliate: SGS NL

Status

- Product Co-ordinator ☐
- Operations Co-ordinator ☐
- Technical Reviewer ☐
- Expert ☒

Validation

Verification

- | | | |
|-------------------------|--------------------------|--------------------------|
| - Local Assessor | <input type="checkbox"/> | <input type="checkbox"/> |
| - Lead Assessor | <input type="checkbox"/> | <input type="checkbox"/> |
| - Assessor | <input type="checkbox"/> | <input type="checkbox"/> |
| / Trainee Lead Assessor | | |

Scopes of Expertise

- | | |
|--|-------------------------------------|
| 1. Energy Industries (renewable / non-renewable) | <input type="checkbox"/> |
| 2. Energy Distribution | <input type="checkbox"/> |
| 3. Energy Demand | <input type="checkbox"/> |
| 4. Manufacturing | <input type="checkbox"/> |
| 5. Chemical Industry | <input checked="" type="checkbox"/> |
| 6. Construction | <input type="checkbox"/> |
| 7. Transport | <input type="checkbox"/> |
| 8. Mining/Mineral Production | <input type="checkbox"/> |
| 9. Metal Production | <input type="checkbox"/> |
| 10. Fugitive Emissions from Fuels (solid,oil and gas) | <input type="checkbox"/> |
| 11. Fugitive Emissions from Production and Consumption of Halocarbons and Sulphur Hexafluoride | <input type="checkbox"/> |
| 12. Solvent Use | <input type="checkbox"/> |
| 13. Waste Handling and Disposal | <input type="checkbox"/> |
| 14. Afforestation and Reforestation | <input type="checkbox"/> |
| 15. Agriculture | <input type="checkbox"/> |

Approved Member of Staff by: Marco Vander Linden Date: April 2007



Statement of Competence

Name: Siddharth Yadav

SGS Affiliate: United Kingdom Limited

Status

- | | |
|---------------------------|-------------------------------------|
| - Product Co-ordinator | <input checked="" type="checkbox"/> |
| - Operations Co-ordinator | <input type="checkbox"/> |
| - Technical Reviewer | <input checked="" type="checkbox"/> |
| - Expert | <input type="checkbox"/> |

Validation

Verification

- | | | |
|-------------------------|-------------------------------------|-------------------------------------|
| - Local Assessor | <input type="checkbox"/> | <input type="checkbox"/> |
| - Lead Assessor | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| - Assessor | <input type="checkbox"/> | <input type="checkbox"/> |
| / Trainee Lead Assessor | | |

Scopes of Expertise

- | | |
|---|-------------------------------------|
| 1. Energy Industries (renewable / non-renewable) | <input checked="" type="checkbox"/> |
| 2. Energy Distribution | <input type="checkbox"/> |
| 3. Energy Demand | <input type="checkbox"/> |
| 4. Manufacturing | <input checked="" type="checkbox"/> |
| 16. Chemical Industry | <input type="checkbox"/> |
| 17. Construction | <input type="checkbox"/> |
| 18. Transport | <input checked="" type="checkbox"/> |
| 19. Mining/Mineral Production | <input checked="" type="checkbox"/> |
| 20. Metal Production | <input type="checkbox"/> |
| 21. Fugitive Emissions from Fuels (solid,oil and gas) | <input type="checkbox"/> |
| 22. Fugitive Emissions from Production and
Consumption of Halocarbons and Sulphur Hexafluoride | <input checked="" type="checkbox"/> |
| 23. Solvent Use | <input type="checkbox"/> |
| 24. Waste Handling and Disposal | <input checked="" type="checkbox"/> |
| 25. Afforestation and Reforestation | <input type="checkbox"/> |
| 26. Agriculture | <input type="checkbox"/> |

Approved Member of Staff by: Marco van der Linden Date: April 2007

- o0o -