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Validation Report

VALIDATION OF THE CDM-PROJECT:

„REDUCTION OF N_2O EMISSIONS FROM THE NEW NITRIC ACID PLANT #5 OF HU-CHEMS FINE CHEMICAL CORP.“

REPORT NO. 600500803

03 July 2012

TÜV SÜD Industrie Service GmbH

Carbon Management Service
Westendstr. 199 - 80686 Munich – GERMANY

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Subject: Validation of the CDM Project "Reduction of N2O emissions from the new nitric acid plant #5 of Hu-Chems Fine Chemical Corp."

Accredited TÜV SÜD Unit: TÜV SÜD Industrie Service GmbH Certification Body "climate and energy" Westendstr. 199 80686 Munich Germany	**TÜV SÜD Contract Partner:** TÜV SÜD Industrie Service GmbH Carbon Management Service Westendstr. 199 80686 Munich Germany
Project Participant(s): Carbon CDM Korea Ltd. (Client) 8th floor, Bongwoo Bldg., 31-7, 1ga Jangchung-Dong, Jung-gu, Seoul Hu-Chems Fine Chemical Corp. 19th floor Kukdong Bldg. 173Toegyero, Jung-Gu, Seoul, 100-705	**Project Site(s):** Hu-Chems Fine Chemical Corp., 7-6, Wollae-dong, Yeosu-si, Jeonnam, Republic of Korea GPS coordinates (decimal format): Latitude: +34.845830 (=34.84583 N) Longitude: +127.741580° (=127.74158 E)
Applied Methodology / Version: ACM0019 / Version 01.0.0.	**Scope(s):** 5 **Technical Area(s):** 5.1
First PDD Version (GSP): PDD version date: 27-09-2011 Version No.: 01 Starting Date of GSP 30-09-2011	**Final PDD version:** PDD version date: 22-06-2012 Version No.: 1.4
Estimated Annual Emission Reduction:	338,990 tCO_2e
Assessment Team Leader: Peretykina, Anna **Assessment Team Members:** Hammer, Martin Yoon, Jung-Ho **Trainees:** -	**Technical Review:** Tausche, Konrad **Responsible Certification Body:** Thomas Kleiser

Summary of the Validation Opinion:

☒ The review of the project design documentation and the subsequent follow-up interviews have provided TÜV SÜD with sufficient evidence for the determination of the project's fulfilment of all stated criteria. In our opinion, the project meets all relevant UNFCCC requirements for the CDM. Therefore, TÜV SÜD recommends the project for registration by the CDM Executive Board if the letters of approval of all Parties involved will be available before the expiring date of the applied methodology(ies) or the applied methodology version respectively.

☐ The review of the project design documentation and the subsequent follow-up interviews have not provided TÜV SÜD with sufficient evidence for the determination of the project's fulfilment of all stated criteria. Therefore, TÜV SÜD will not recommend the project for registration by the CDM Executive Board and will inform the project participants and the CDM Executive Board of this decision.

Abbreviations

ACM	Approved Consolidated Methodology
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CDM EB	CDM Executive Board
CER	Certified Emission Reduction
CMP	Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol
CR / CL	Clarification Request
DNA	Designated National Authority
DOE	Designated Operational Entity
EIA / EA	Environmental Impact Assessment / Environmental Assessment
ER	Emission Reduction
FAR	Forward Action Request
FSR	Feasibility Study Report
GHG	GreenHouse Gas(es)
HuChems	Hu-Chems Fine Chemical Corp.
IPCC	Intergovernmental Panel on Climate Change
IRL	Information Reference List
KP	Kyoto Protocol
MTPD	Metric Tons Per Day
MP	Monitoring Plan
n/a	Not available
PDD	Project Design Document
PFD	Process Flow Diagram
PP	Project Participant
TÜV SÜD	TÜV SÜD Industrie Service GmbH
UNFCCC	United Nations Framework Convention on Climate Change
VVM	Validation and Verification Manual

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Table of Contents Page

1 INTRODUCTION

1.1 Objective

The objective of the validation process is to provide an independent assessment by a third party, a Designated Operational Entity (DOE), of a proposed project activity. The assessment involves the evaluation of the project basis and design identified in the Project Design Document (PDD) using the defined criteria outlined by the registration under the Clean Development Mechanism (CDM). Validation is part of the CDM project cycle and results in a conclusion by the executing DOE on whether or not a project activity is valid to be submitted for registration to the CDM Executive Board (CDM-EB). The ultimate decision on the registration of a proposed project activity rests with the CDM-EB and the Parties involved.

The project addressed in this validation report has been submitted under the following project title:

”Reduction of N2O emissions from the new nitric acid plant #5 of Hu-Chems Fine Chemical Corp.”

1.2 Scope

The scope of any assessment is defined by the underlying legislation, regulation and guidance given by relevant entities or authorities. In the case of CDM project activities, the scope is set by:

- The Kyoto Protocol, in particular § 12 and modalities and procedures for the CDM
- Decision 2/CMP1 and Decision 3/CMP.1 (Marrakech Accords)
- Further COP/MOP decisions with reference to the CDM (e.g. decisions 4 – 8/CMP.1)
- Decisions and specific guidance outlined by the EB which are published der http://cdm.unfccc.int
- Guidelines for Completing the Project Design Document (CDM-PDD) and the Proposed New Baseline and Monitoring Methodology (CDM-NM)
- Baselines and monitoring methodologies (including GHG inventories)
- Management systems and auditing methods
- Environmental issues relevant to the applicable sectoral scope
- Applicable environmental and social impacts and aspects of CDM project activity
- Sector specific technologies and their applications
- Current technical and operational knowledge of the specific sectoral scope and information on best practice

The validation process is not meant to provide any form of consulting for the project participant (PP). However, stated requests for clarifications, corrective actions, and/or forward actions may provide input for improvement of the project design.

Once TÜV SÜD receives the PDD, it is made publicly available on the UNFCCC website and on TÜV SÜD’s website, which initiates a 30 day global stakeholder consultation process (GSP). In special circumstances, such as when a project design changes, the GSP may need to be repeated. Information on the PDDs is presented on page 1 of this report.

The purpose of a validation is to demonstrate compliance or non-compliance of the project with all stated and valid CDM requirements. Additionally, the purpose of validation is to enable the registration of CDM projects, which is only a part of the total CDM project cycle.

2 VALIDATION METHODOLOGY

The project assessment is based on the "Clean Development Mechanism Validation and Verification Manual" and is conducted using standard auditing techniques to assess the correctness of the information provided by the project participants. Before the assessment begins, members of the team covering the technical scope(s), sectoral scope(s), and relevant host country experience for evaluating the CDM project activity are appointed. Once the project is made available for the stakeholder consultation process, members of the team carry out the desk review, follow-up actions, resolution of issues identified, and the preparation of the validation report. The prepared validation report and other supporting documents then undergo an internal quality control by the CB "climate and energy" before being submitted to the CDM-EB.

In order to ensure transparency, assumptions must be clear and stated explicitly and background material must also be referenced. TÜV SÜD has developed a methodology-specific protocol customized for the project. The protocol demonstrates, in a transparent manner, the project criteria (requirements), discussion on each criterion by the assessment team, and the results from validating the identified criteria.

The validation protocol serves the following purposes:

- To organize the details and provision of clarifications on the requirements of which a CDM project is expected to meet
- To elucidate how a particular requirement has been validated as well as to document the results of the validation and any adjustments made to the project design document.

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

Validation Protocol Table 1: Conformity of Project Activity and PDD				
Checklist Topic / Question	**Reference**	**Comments**	**PDD in GSP**	**Final PDD**
The checklist is organised in sections following the arrangement of the applied PDD version. Each section is then sub-divided. The lowest level constitutes a checklist question / criterion.	*The section gives reference to documents in which the answer to the checklist question or item is found in case the comment*	*The section is used to elaborate and discuss the checklist question and/or the conformance to the question. It is used to explain the conclusions reached. In some cases sub-checklists are applied indicating yes/no decisions on the compliance with*	*The section is used to present conclusions based on the assessment of the first PDD version. The PDD is either acceptable based on evidence provided (☑) or a **Corrective Action Request (CAR)** is issued due to non-compliance with the checklist question (See below). **Clarification Request (CR)** is used when the validation team has identified a need for further clarification. **Forward***	*Conclusions are presented in the same manner based on the assessment of the final PDD version and further documents including assumptions presented in the documentation.*

	refers to documents other than the PDD.	*the stated criterion. Any **Request** has to be substantiated within this column.*	***Action Request** is issued to highlight issues related to project implementation that require review during the first verification.*	

Validation Protocol Table 2: Compilation and Resolutions of CARs, CRs and FARs			
	Comments and Results	Ref	Conclusion and IRL
Issue	*Corrective Action, Clarification or Forward Action Requests.*	*Reference to the checklist question number in Table 1*	*Final conclusions and relevant references.*
Response	*The responses given by the client or other project participants during communication with the validation team.*		
Assessment	*Summary of the discussion and revision of project documentation together with the validation team's responses*		

In case it is found that the project activity does not meet the CDM requirements, more detailed information on this decision is presented in Table 3.

Validation Protocol Table 3: Unresolved Corrective Action and Clarification Requests		
Clarifications and corrective action requests	**Id. of CAR/CR**	**Explanation of the Conclusion for Denial**
Referenced request if final conclusions from table 2 resulted in a denial.	*Identifier of the Request.*	*Detailed explanation of why the project is considered non-compliant with a criterion and a clear reference to the criterion*

The completed validation protocol is enclosed in Annex 1.

2.1 Appointment of the Assessment Team

According to the technical scopes and experiences in the sectoral or national business environment, TÜV SÜD has composed a project team in accordance with the appointment rules of the TÜV SÜD certification body "climate and energy".

The composition of an assessment team has to be approved by the Certification Body (CB) to assure that the required skills are covered by the team. The CB TÜV SÜD operates the following qualification levels for team members that are assigned by formal appointment rules:

- Assessment Team Leader (ATL);
- Validator (V);
- Validator Trainee (T);
- Technical Experts (TE).

It is required that the sectoral scope(s) and the technical area(s) linked to the methodology and project have to be covered by the assessment team.

Assessment Team:

Name	Qualification	Coverage of scope	Coverage of technical area	Coverage of financial aspect	Host country experience	Onsite
Peretykina, Anna	**ATL**	**-**	-	☑	☑	**-**
Hammer, Martin	V	☑	☑	☑	☑	☑
Yoon, Jung-Ho	V	-	-	-	☑	☑

Technical Reviewer:

- Tausche, Konrad

2.2 Review of Documents

The PDD for the GSP was submitted to the DOE in September 2011. The PDD and additional background documents related to the project design and baseline have been reviewed to verify the correctness, credibility, and interpretation of the presented information. Furthermore, a cross-check between information provided and information from other sources has been done as an initial step of the validation process. A complete list of all documents and evidence material reviewed is attached as annex 2 to this report.

2.3 Follow-up Interviews

On 06/10/2011, TÜV SÜD performed interviews, telephone conferences, and physical site inspections with project stakeholders to confirm relevant information, and to resolve issues identified in the first document review. The following table provides a list of all persons interviewed in this process.

Persons Interviewed:

Name	Organisation
Mr. Byung-Chul Lim	Hu-Chems.
Mr. Jong-Hyuk Ra	Hu-Chems
Mr. Sung-Hyun Kyung	Hu-Chems
Mr. Ki-Tai Kim	Hu-Chems
Mr. Soon-Gi Kim	Hu-Chems
Mr. Dong-Hyun Kim	Carbon CDM Korea Ltd
Mr. AndreasRammelmüller	Carbon Climate Protection GmbH

2.4 Cross-check

During the validation process the team has made reference to available information related to similar projects or technologies as the CDM project activity. Project documentation has also been reviewed against the approved methodology/ies applied to confirm the appropriateness of formulae and correctness of calculations.

2.5 Resolution of Clarification and Corrective Action Requests

The objective of this phase of the validation is to resolve the requests for corrective actions, clarifications, and any other outstanding issues which need to be clarified for TÜV SÜD`s conclusion on the project design. The CARs and CRs raised by TÜV SÜD are resolved during communication between the client and TÜV SÜD. To guarantee the transparency of the validation process, the

concerns raised and responses that have been given are documented in more detail in the validation protocol in Annex 1.

The final PDD version submitted in June 2012 serves as the basis for the final assessment presented. Additional changes to the project during the validation process are not considered to be significant with respect to the main CDM objectives. The two CDM main objectives are the reduction of anthropogenic GHG emissions and the contribution of sustainable development to the host country.

2.6 Internal Quality Control

Internal quality control is the final step of the validation process and is conducted by the CB “climate and energy” who checks the final documentation, which includes the validation report and annexes. The completion of the quality control indicates that each report submitted has been approved either by the head of the CB or the deputy. In projects where either the Head of the CB or his/her deputy is part of the assessment team, the approval is given by the one not serving on the project team.

After confirmation by the PP, the validation opinion and relevant documents are submitted to the EB through the UNFCCC web-platform.

3 SUMMARY

The assessment work and the main results are described below in accordance with the VVM reporting requirements. The reference documents indicated in this section and Annex 1 are stated in Annex 2 of this report.

3.1 Approval

The project participants are Hu-Chems Fine Chemical Corp. and Carbon CDM Korea Ltd. both of the Republic of Korea. The host Party the Republic of Korea meets the requirements to participate in the CDM.

The DNA of the Republic of Korea issued a LoA (IRL 11a) on 05th April 2012 authorizing Hu-Chems Fine Chemical Corp. and Carbon CDM Korea Ltd. as a project participants. TÜV SÜD received these letters from the project participants directly and considers the provided letters as authentic as reconfirmed with DNA of the Republic of Korea by local verifier (IRL 11c).

Furthermore, after checking the provided LoA, TÜV SÜD confirms that the letter refer to the precise proposed CDM project activity title in line with the title in the PDD “Reduction of N2O emissions from the new nitric acid plant #5 of Hu-Chems Fine Chemical Corp.”.

The letter also indicates that the Republic of Korea is a Party to the Kyoto Protocol, and that the participation in the CDM project “Reduction of N2O emissions from the new nitric acid plant #5 of Hu-Chems Fine Chemical Corp.” is voluntary. The LoA also confirms that the proposed CDM project activity contributes to the sustainable development of the Republic of Korea (host country). Based on the information given in the letter, TÜV SÜD considers the approval as unconditional with respect to these items.

The LoA has been issued by the respective Party’s DNA - the Ministry of Knowlwdge Economy of the Republic of Korea. The LoA does not refer to a specific version of the PDD or validation report.

TÜV SÜD considers that the requirements of VVM (§§ 45-48) have been met.

3.2 Participation

The participants of the project activity have been approved by the corresponding Party, which is confirmed by the issued LoA.

The means of validation used are similar to the ones described in Section 3.1, specifically in regard to the approval process of the project activity.

3.3 Project design document

The PDD is compliant with relevant form and guidance as provided by UNFCCC.

The most recent version of the PDD form was used.

TÜV SÜD considers that the guidelines for the completion of the PDD in their most recent version have been followed. Relevant information was provided by the participants in the applicable PDD sections. Completeness was assessed through the protocol included in Annex 1.

3.4 Project description

The following description of the project as per PDD was verified during the on-site audit:

The proposed project activity includes the installation of a tertiary N2O abatement facility at the new nitric acid plant #5 of Hu-Chems Fine Chemical Corp. in Yeosu, Republic of Korea. The nitric acid plant is currently under construction and should become commercially operational not before September 2012 (date for mechanical completion is end of August 2012 as confirmed by EPC Contractor (IRL 4l)). The plant is designed by Uhde GmbH (IRL 4b) and it´s design capacity is 1,150 MTPD. According to the design parameters shown in the Proces Flow Diagram (PFD) (IRL6b) the plant will emit about 6,76 kgN2O/tHNO3 without any N2O abatement system, which is more than the default baseline emission factors according to the applied methodology. The applied tertiary N2O abatement facility in the project activity is expected to reduce approximately 96% (IRL 4d) of the emitted N2O from the nitric acid plant. The expected abatement efficiency has been crosschecked with CDM project activities applying similar N2O abatement technology (CDM-P 0765; CDM-P 0490) and found to be plausible.

The information presented in the PDD on the technical design is consistent with the actual planning and implementation of the project activity confirmed in the following ways:

- A review and cross check of data and information (see annex 2).
- An on-site visit with relevant stakeholder and personnel with knowledge of the project in attendance. In case of doubt, further cross checks through additional interviews were conducted.
- A review of information related to similar projects or technologies which have been used if available to validate the accuracy and completeness of the project description.

In conclusion, TÜV SÜD confirms that the project description, as included in the PDD, is sufficiently accurate and complete in order to comply with the requirements of the CDM.

3.5 Baseline and monitoring methodology

3.5.1 Applicability of the selected methodology

Compliance with each applicability condition as listed in the chosen baseline and monitoring methodology ACM0019 Version 01.0.0 and relevant tool “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (Version 2.0.0)” has been demonstrated.

The assessment was carried out for each applicability criterion and included, among other checks, a compliance check of the local project setting with the applicability conditions in regard to baseline setting and eligible project measures. This assessment also included the review of secondary sources to demonstrate the compliance with applicability conditions.

- The methodology applies to project activities that introduce N2O abatement measures in nitric acid plants

The proposed project activity destroys N2O emissions by the reduction of N2O in the tail gas stream of the nitric acid plant #5 of Hu-Chems (tertiary abatement technology). This has been verified by The “License Agreement between Hu-Chems and Uhde Basic Engineering for the Nitric Acid Plant” (IRL 4b) that confirms the engineering of the new nitric acid plant. The CDM project activity foresees the installation of a tertiary N2O abatement system as described in PDD. The audit team could verifiy this with IRL 4d (“Supplementary agreement for option of EnviNOx (DeN2O) system” with Uhde GmbH).

- In the case that the nitric acid plant started commercial operation before the implementation of the CDM project activity, the project participants shall demonstrate that there was no secondary or tertiary abatement technology installed in the respective nitric acid plant

The nitric acid plant #5 of Hu-Chems has not started commercial production yet. This has been verified by inspection of the construction site during onsite visit. The project is scheduled to start commercial operation not before September 2012 together with the proposed CDM project activity. The date for mechanical completion is end of August 2012 as confirmed by EPC Contractor (IRL 4l).

- Continuous real-time measurements of the N2O concentration and the total gas volume flow can be carried out in the tail gas stream after the abatement of N2O emissions throughout the crediting period of the project activity.

As confirmed by the engineering company Uhde GmbH (IRL 4d and IRL 4h) continuous real-time measurements of the N2O concentration and the total gas volume flow can be carried out in the tail gas stream after the abatement of N2O emissions at the new nitric acid plant 5 throughout the crediting period of the project activity.

- No law or regulation which mandates the complete or partial destruction of N2O from nitric acid plants exists in the host country where the CDM project activity is implemented.

The "Clean Air Conservation Act"[1] (IRL 10b) and the "Framework act on Low Carbon, Green Growth"[2] (IRL 10i) were reviewed and no law or regulations requiring the abatement of N2O emissions were found. This complies with local expertise of the validation team.

The revised PDD (IRL 1c) Chapter B.2. includes references to relevant local regulations and policies to justify the applicability of ACM0019 (i.e. Clean Air Conservation Act and GHG and Energy Target Scheme based on the Framework act on Low Carbon, Green Growth).

The methodology-specific protocol, included in Annex 1, documents the assessment process. The results of the compliance check as well as relevant evidence are detailed in the protocol and the information reference list.

TÜV SÜD confirms that the chosen baseline and monitoring methodology is applicable to the project activity and that the selected methodology applies correctly to the project boundary, baseline identification and algorithms and/or formulae to determine emission reduction

Emission sources, not addressed by the applied methodology and expected to contribute more than 1% of the overall expected average annual emission reductions, have not been identified.

3.5.2 Project boundary

The project boundary was assessed considering information gathered from the physical site inspection, interviews, and secondary evidence received on the design of the project.

[1] South Korean regulation regarding air pollutants

[2] HuChems is among 470 companies which have been designated as mandatory participants in the Greenhouse Gas and Energy Target Scheme. The designation is based on the "Framework Act on Low Carbon, Green Growth" which came into effect on April 14, 2010 and "Guidelines on designation and management of companies for greenhouse gas reduction target management (Notification No 2010-109 of the Ministry of Environment on August 30, 2010)". The scheme was made to impose the target for greenhouse gas emission as well as energy use of controlled companies. (Please refer also to Chapter 3.5.3 and Chapter 3.6)

The spatial extent of the project boundary encompasses the facility and equipment for the new nitric nitric acid plant5 of Hu-Chems Fine Chemical Corp. in Yeosu, Republic of Korea from the inlet of the ammonia burner to the outlet of the tail gas section.

Relevant documents assessed to confirm the project boundary are the following:

- License Agreement between HuChems and Uhde Basic Engineering for the Nitric Acid Plant (IRL 4b)
- Approval for Land usage from Korea Industrial Complex Corporation on 05/10/2011 (reason: Plant construction of Nitric Acid #5 plant) (IRL 4e)
- Construction approval for Nitric Acid #5 plant from Yeosu City on 08/09/2011 (IRL 4f)
- Process Flow Diagram (PFD) issued by UHDE in 2010 for HU-CHEMS 5 Seoul, Korea Nitric Acid Plant (IRL 6b)

Details are listed in Annex 1 (B.3.)

Therefore, TÜV SÜD confirms that the identified boundary, the selected sources, and gases as documented in the PDD are justified for the project activity and are fully in line with the requirements set by the applied methodology.

3.5.3 Baseline identification

The PDD defines the baseline scenario as follows:

N2O is emitted to the atmosphere with no N2O abatement measure being implemented.

The following procedure regarding identification of the baseline scenario and demonstration of additionality is given in the applied methodology:

"In the absence of regulations requiring the abatement of N2O emissions, the operator of the nitric acid plant has no economic incentives to take any N2O abatement measures because this entails capital and operating costs but no financial benefits. Therefore, the CDM project activity is considered additional and the baseline scenario is that the N2O is emitted to the atmosphere with no N2O abatement measure being implemented."

The methodology does not require to use any tool to identify the baseline (i.e no barrier, investment or common practice analysis).

The information presented in the PDD has been validated by an initial document review of all data. Further confirmation has been made based on the on-site visit and a review of information from similar projects and/or technologies. The sources referenced in the PDD have been quoted correctly. The information was verified against credible sources, such as the following:

The "Clean Air Conservation Act" (IRL 10b) and the "Framework Act on Low Carbon, Green Growth" (IRL 10i) were reviewed and no regulations requiring the abatement of N2O emissions were found. This complies with local expertise of the validation team.

As mandatory participant in the "Greenhouse Gas and Energy Target Scheme" HuChems has recieved one overall, joint GHG target for the whole company Hu-Chems of 416,113 tCO2e for 2012 (Notification from Authority KEMCO - IRL 10a). No targets for subsequent years have been enacted yet. This represents the current legal and regulatory situation in Korea and complies with the local expertise of the audit team (please refer to FAR 01 in Annex 1) Hence the "Greenhouse Gas and Energy Target Scheme" does not mandate the complete or partial destruction of N2O from nitric acid plants .

PPs clarified (CR04) that Hu-Chems will be able to fulfil its joint GHG target without the introduction of any N2O abatement measure in its plant Hu-Chems #5, as the expected overall emissions from

all eligible facilities in Hu-Chems (320,269 tCO2e) are below the joint GHG target (416,113 tCO2e). There are currently no economic benefits when undershooting the joint GHG target.

PPs submitted following credible sources to confirm the situation which were verified by the audit team:

- the “Framework act on Low Carbon, Green Growth” (IRL 10i), which does not consider any trading of emission reduction. This complies with local expertise of the validation team.
- the official notice from KEMCO (IRL 10a); which state the joint GHG target for HuChems (in tCO2e) for 2012 of 416,113 tCO2e
- a calculation of the expected GHG emissions of whole HuChems in 2012 of 320,269 tCO2e (IRL 10c).The expected GHG emissions of whole HuChems in 2012 of 320,269 tCO2e are derived from three emission sources (a) Emissions from existing facilities, b) Emissions from new facilities (except N2O from new nitric acid plant 5) and c) N2O emission from operation of the new nitric acid plant 5 from September to December 2012. The information was verified against credible sources, such as the following:

a) Emissions from existing facilities (operational in 2007 – 2009): 30,803 tCO2e

   Calculation as per GHG Target Scheme regulations: Average on historical emissions in 2007 to 2009 from target eligible facilities as provided to the authority for GHG Target setting (IRL 10h) times a growth rate (IRL 10d) agreed with the authority.

b) Emissions from new facilities (except N2O from the new nitric acid plant 5): 11,346 tCO2e

   Expected emissions from new facilities (all but N2O from the new nitric acid plant 5) in 2012, as confirmed by the authority for GHG Target setting (IRL 10e)

c) N2O emission from operation of the new nitric acid plant 5 from September to December 2012: 278,120 tCO2e

   Calculation based on plant design documents (Process Flow Diagram) (IRL 10i) and days of operation (September to December 2012) (IRL 4l). A sensitivity analysis (IRL6e) varying the expected start of operation of HuChems #5 plant by +/- 1 month substantiate the overall result that the expected emission in 2012 are below the target.

As Hu-Chems target is higher than the estimated emission in 2012 and the existing system does not foresee any trading of emission reduction there is currently no economic incentive that the operator of the new nitric acid plant take any N2O abatement measures.

TÜV SÜD has determined that no reasonable alternative scenario has been excluded and the requirements from applied methodology ACM0019 version 1.0.0. are followed.

In the absence of regulations requiring the abatement of N2O emissions, the operator of the nitric acid plant has no economic incentives to take any N2O abatement measures because this entails capital and operating costs but no financial benefits. Therefore, the CDM project activity is considered additional and the baseline scenario is that the N2O is emitted to the atmosphere with no N2O abatement measure being implemented.

Based on the validated assumptions TÜV SÜD considers that the identified baseline scenario is reasonable including a description of the situation in the absence of the proposed CDM project activity (i.e. no N2O abatement technology employed).

Taking the definition of the baseline scenario into account, TÜV SÜD confirms that all relevant CDM requirements, including relevant and/or sectoral policies and circumstances, have been identified correctly in the project PDD.

A verifiable description of the baseline scenario has been included in the PDD.

In regard to item 87 of VVM, TÜV SÜD confirms the following statements:

(a) All the assumptions and data used by the project participants are listed in the PDD, including their references and sources;

(b) All documentation used is relevant for establishing the baseline scenario and correctly quoted and interpreted in the PDD;

(c) Assumptions and data used in the identification of the baseline scenario are justified appropriately, supported by evidence, and can be deemed reasonable;

(d) Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD;

(e) The approved baseline methodology has been correctly applied to identify the most reasonable baseline scenario, and the identified baseline scenario reasonably represents what would occur in the absence of the proposed CDM project activity.

3.5.4 Algorithm and/or formulae used to determine emission reductions

TÜV SÜD has assessed the calculations of project emissions and baseline emissions and emission reductions. Corresponding calculations have been carried out based on calculation spreadsheets (IRL 9b). The parameters and equations presented in the PDD, as well as other applicable documents, have been compared with the information and requirements presented in the methodology and respective tools. An equation comparison has been made to ensure consistency between all the formulae presented in the calculation files and in the PDD, methodology, and tools.

The assumptions and data used to determine the emission reductions are listed in the PDD and all the sources have been checked.

Based on the information reviewed it is confirmed that the sources used are correctly quoted and interpreted in the PDD.

The values presented in the PDD are considered reasonable based on the documentation and references reviewed and the results of the interviews.

The baseline and monitoring methodology has been applied correctly according to requirements.

The estimate of the baseline emissions are considered correct as the calculations have been reproduced by the audit team with the attainment of the same results.

Detailed information on the verification of the parameters used in the equations are found in Annex 1. The algorithms for the determination of the baseline, project, and leakage are discussed in the following sections.

3.5.4.1 Baseline Emissions

The calculation of the baseline emissions have been conducted using procedures and formula as described in the methodology ACM0019 / Version 01.0.0. The project boundary consideres N2O emissions at the NH3 oxidation at the primary catalyst gauzes of the new nitric acid plant 5 of Hu-Chems Fine Chemical Corp. in Yeosu as baseline emissions.

Baseline N2O emission factors for nitric acid production in the monitoring period n (kgN2O / tHNO3) ($EF_{BL,N2O,n}$) Global Warming Potential (GWP) of N2O are applied according to the methodology ACM0019 / Version 01.0.0.

Nitric acid produced in the monitoring period n ($P_{NA,n}$) is included in the monitoring plan according to the methodology (please refer also to Chapter 3.7 below).

3.5.4.2 Project Emissions

The calculation of the project emissions has been conducted using procedures and formula as described in the methodology ACM0019 / Version 01.0.0. The project boundary consideres N2O emissions at the NH3 oxidation at the primary catalyst gauzes of the new nitric acid plant 5 as project emissions (N2O not destroyed in abatement facitilty). Also the tertiary abatement facility is included in the project activity which is designed to operate without any usage of fossil fuels (IRL4d, 6d), hence this emission source is set to zero in the PDD. Additionally no by-pass will be implemented. Thus, the gas stream from the nitric acid plant will in any case be sent to the tertiary N2O abatement facility and cannot be vented to the atmosphere through a by-pass. The PDD considers a default value for the amount of N2O released through the by-pass to a tertiary N2O abatement system to the atmosphere ($Q_{N2O,by\text{-}pass,n}$) of zero. This choice is found to be reasonable and it is justified with the statement from Uhde (IRL 4i) which confirms that the nitric acid plant of Huchems 5 has no bypass for the EnviNOx® reactor. The nitric acid plant can only operate if the tail gas is passing the EnviNOx® reactor. Even during shut down the tail gas will pass through the EnviNOx® reactor.

The amount of N2O emissions from the tail gas stream of the project plant ($Q_{N2O,tail\ gas,n}$) is determined using the “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (Version 2.0.0) which is currently the latest approved version.

The tool covers possible measurement combinations, providing six different options to determine the mass flow of a particular greenhouse gas (Option A to F).PPs justified to use Option A (volume flow of gaseous stream on dry basis, volumetric fraction on dry or wet basis) using the currently available information. The tool states two ways how to demonstrate that the gaseous stream is dry. These are:

a) Measure the moisture content of the gaseous stream ($C_{H2O,t,db,n}$) and demonstrate that this is less or equal to 0.05 kg H2O/m³ dry gas; or

b) Demonstrate that the temperature of the gaseous stream (T_t) is less than 60°C (333.15 K) at the flow measurement point.

The ex-ante determination of the moisture content at the measuring point according to process parameters shows a value of about 0.003 $kg_{H2O/m3\ dry\ gas}$. Hence Option A is applicable.

The validation team reviewed this ex-ante determination and verified the input parameters which were found to be consistent with the PFD (Process Flow Diagram) (IRL 6b) of the new nitric acid plant.

Moreover as mentioned in the “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (Version 2.0.0)” an assumption that the gaseous stream is dry. This is conservative for the situation that the N2O is overestimated (calculating project emissions).

3.5.4.3 Leakage Emissions

Any leakage emissions sources are deemed to be negligible according to the applied methodology ACM0019 / Version 01.0.0

3.5.4.4 Emission Reductions

In summary, the calculation of the baseline emissions, project emissions and the emission reductions are considered correct.

3.6 Additionality

The additionality of the project has been presented in the PDD using following approach according to the applied methodology:

"In the absence of regulations requiring the abatement of N2O emissions, the operator of the nitric acid plant has no economic incentives to take any N2O abatement measures because this entails capital and operating costs but no financial benefits. Therefore, the CDM project activity is considered additional and the baseline scenario is that the N2O is emitted to the atmosphere with no N2O abatement measure being implemented."

The methodology does not require to use any tool to identify the baseline (i.e no barrier, investment or common practice analysis).

The approach used in the PDD has been assessed initially through the document review (e.g. News from Ministry of Environment (IRL 10f) including host country expertise.

On site, the additionality was discussed principally with Mr. Jong-Hyuk Ra, Team manager / Project 1 team, Hu-Chems and Mr. AndreasRammelmüller, Project manager, Carbon Climate Protection GmbH. Further clarification was necessary hence Clarification Request 3 and Clarification Request 4 were raised.

Finally, the data, rationales, assumptions, justifications, and documentation provided have been verified using local knowledge. This information was also confirmed through the following documentation:

The "Clean Air Conservation Act" (IRL 10b) and the "Framework Act on Low Carbon, Green Growth" (IRL 10i) were reviewed and no regulations requiring the abatement of N2O emissions were found. This complies with local expertise of the validation team.

As mandatory participant in the "Greenhouse Gas and Energy Target Scheme" HuChems has recieved one overall, joint GHG target for the whole company Hu-Chems of 416,113 tCO2e for 2012 (Notification from Authority KEMCO - IRL 10a). No targets for subsequent years have been enacted yet. This represents the current legal and regulatory situation in Korea and complies with the local expertise of the audit team (please refer to FAR 01 in Annex 1). Hence the "Greenhouse Gas and Energy Target Scheme" does not mandate the complete or partial destruction of N2O from nitric acid plants .

PPs clarified (CR04) that Hu-Chems will be able to fulfil its joint GHG target without the introduction of any N2O abatement measure in its plant Hu-Chems #5, as the expected overall emissions from all eligible facilities in Hu-Chems (320,269 tCO2e) are below the joint GHG target (416,113 tCO2e). There are currently no economic benefits when undershooting the joint GHG target.

PPs submitted following credible sources to confirm the situation which were verified by the audit team:

- the "Framework act on Low Carbon, Green Growth" (IRL 10i), which does not consider any trading of emission reduction. This complies with local expertise of the validation team.
- the official notice from KEMCO (IRL 10a); which state the joint GHG target for HuChems (in tCO2e) for 2012 of 416,113 tCO2e
- a calculation of the expected GHG emissions of whole HuChems in 2012 of 320,269 tCO2e (IRL 10c).The expected GHG emissions of whole HuChems in 2012 of 320,269 tCO2e are derived from three emission sources (a) Emissions from existing facilities, b) Emissions from new facilities (except N2O from new nitric acid plant 5) and c) N2O emission from operation of the new nitric acid plant 5 from September to December 2012. The information was verified against credible sources, such as the following:

a) Emissions from existing facilities (operational in 2007 – 2009): 30,803 tCO2e

   Calculation as per GHG Target Scheme regulations: Average on historical emissions in 2007 to 2009 from target eligible facilities as provided to the authority for GHG Target setting (IRL 10h) times a growth rate (IRL 10d) agreed with the authority.

b) Emissions from new facilities (except N2O from the new nitric acid plant 5): 11,346 tCO2e

   Expected emissions from new facilities (all but N2O from the new nitric acid plant 5) in 2012, as confirmed by the authority for GHG Target setting (IRL 10e)

c) N2O emission from operation of the new nitric acid plant 5 from September to December 2012: 278,120 tCO2e

   Calculation based on plant design documents (Process Flow Diagram) (IRL 10i) and days of operation (September to December 2012) (IRL 4l). A sensitivity analysis (IRL6e) varying the expected start of operation of HuChems #5 plant by +/- 1 month substantiate the overall result that the expected emission in 2012 are below the target.

Based on the aforementioned approach, TÜV SÜD confirms that the documentation provided is appropriate for this project. Emission reductions attributable to the project are additional to any that would occur in the absence of the project activity.

3.6.1 Prior consideration of the clean development mechanism

The starting date of the project activity is determined by the date when the contract with the supplier on the delivery of the N2O abatement facility will become effective, according to actual planning. In order to corroborate this information, the assessment team has reviewed the Supplementary agreement for option of EnviNOx (DeN2O) system with Uhde GmbH on October, 2010 (IRL 4b) and the actual project planning during onsite audit. The audit team has crosschecked this information with a statement from ThyssenKrupp Uhde dated and signed on 11/11/2011 which confirms that the "Supplementary Agreement for option of EnviNOx® Upgrade system at HuChems 5 plant (IRL 4j)" is not effective. Please refer also to Clarification Request No 7.

The starting date is determined to be 15/07/2012, which is after the GSP; therefore, it is confirmed that the project complies with the requirement of the latest version of the Guidance on prior consideration of CDM.

3.7 Monitoring plan

The monitoring plan presented in the PDD complies with the requirements of the applicable methodology ACM0019 / Version 01.0.0. The assessment team has verified all parameters in the monitoring plan against the requirements of the methodology and no deviations have been found.

The procedures have been reviewed by the assessment team through document review (IRL 4d) and interviews with the relevant personnel. The information provided and a physical inspection has allowed the assessment team to confirm that the proposed monitoring plan is feasible within the project design. The relevant points of monitoring plan have been discussed with the PPs. Specifically; these points include the location of meters, data management, and the quality assurance and quality control procedures to be implemented in the context of the project.

The monitoring parameter determining the baseline emissions is the nitric acid produced ($P_{NA,n}$). The nitric acid flow is measured with a coriolis flow meter and concentration is determined based on measured parameters. Values are sent to the DCS (control room), and the nitric acid production (as 100% HNO3) is calculated based on mass flow and HNO3 concentration. Final production values are exported in production reports.

The monitoring system and procedures will be integrated in Hu-Chems quality management system. All monitoring equipment will be serviced, calibrated and maintained according to the manufacturers' instructions and/or international/national standards, as applicable.

The amount of N2O emissions from the tail gas stream of the project plant ($Q_{N2O,tail\ gas,n}$) will be determined using the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream". The relevant monitoring system is to be installed and maintained throughout the crediting period based on the European Norm 14181 (2004), or any more recent update of that standard.

The applied methodology ACM0019 version 01.0.0 is applicable for secondary and tertiary N2O abatement systems. The project activity includes a tertiary system. This is clearly described in the PDD. In case the project activity introduces tertiary N2O abatement, then the methodology requires that any remaining N2O emissions from the project plant and CO2 emissions arising from the operation of the tertiary abatement system are included as project emissions in the project boundary.

In regard to CO2 emission the technology which will be applied does not use any fossil fuels. Hence PPs justifies that emissions from this source are considered to be zero as process works very well at temperatures above about 425°C and expected level of tail gas temperature are in this range. As checked by the audit team this is in accordance with the PFD of Hu Chems 5 plant (IRL 6b)

The methodology requires to use the latest approved versions of the following tools: "Tool to determine the mass flow of a green-house gas in a gaseous stream" The latest version is (Version 2.0.0)" which is applied according to PDD,

The tool covers the possible measurement combinations, providing six different calculation options to determine the mass flow of a particular greenhouse gas (Option A to F). PPs justified to use Option A (volume flow of gaseous stream on dry basis, volumetric fraction on dry or wet basis) based on the currently available information. This Option states two ways how to demonstrate that the gaseous stream is dry. These are:

a) Measure the moisture content of the gaseous stream (CH2O,t,db,n) and demonstrate that this is less or equal to 0.05 kg H2O/m³ dry gas; or

b) Demonstrate that the temperature of the gaseous stream (Tt) is less than 60°C (333.15 K) at the flow measurement point.

The ex-ante determination of the moisture content at the measuring point according to process parameters shows a value of about 0.003 kgH2O/m3 dry gas. Hence Option A is applicable.

The validation team reviewed this ex-ante determination and verified the input parameters which were found to be consistent with the PFD of Hu Chems 5 plant (IRL 6b). Moreover as mentioned in the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 2.0.0)" the assumption that the gaseous stream is dry is conservative for the situation that the N2O is overestimated (calculating project emissions). Anyway, the moisture content of the gaseous stream at normal conditions $C_{H2O,t,db,n}$ will be monitored according to the requirements of the "Tool to determine the mass flow of a green-house gas in a gaseous stream".

The flow of NH3 to the ammonia oxidation reactor indicates the operational status to determine the Number of hours of operation in a monitoring period. In case, the volume flow of NH3 to the ammonia oxidation reactor lies above the threshold of 500 Nm³/h during an hour, the reactor is considered in operation. The verification team consideres the flow of NH3 to the ammonia oxidation reactor as reasonable parameter to determine the plant status. The threshold of 500 Nm³/h was confirmed by the statement from Uhde (IRL 4m).

The nitric acid plant of Huchems 5 has no bypass for the EnviNOx® reactor. The nitric acid plant can only operate if the tail gas is passing the EnviNOx® reactor. Even during shut down the tail gas will

pass through the EnviNOx® reactor. Revised PDD considers a default value for QN2O,by-pass,n of zero. This choice is found to be reasonable and it is justified with the statement from Uhde (IRL 4i).

The validation team has no doubts that PPs will be able to implement the monitoring plan according to ACM0019 and the achieved emission reductions can be reported ex-post and verified.

3.8 Sustainable development

The LoA of the host country presents a statement that the project contributes to the sustainable development of the host party.

3.9 Local stakeholder consultation

The relevant local stakeholders have been invited via invitation cards and announcements in in newspapers. The evidence of these invitations is given by (IRL 8a, IRL 8f). The assessment team has reviewed the documentation in order to validate the inclusion of relevant stakeholders. Team local expertise has confirmed that the communication method used to invite the stakeholders is appropriate. The summary of comments presented in the PDD has been verified with the documentation of the stakeholder consultation (IRL 8b, IRL 8c, IRL 8d, IRL 8e) and has been found to be complete.

Comments presented by the local stakeholders have been taken into account by the PP and has been verified with information obtained during interviews.

Hence, the local stakeholder consultation has been performed adequately according to the CDM requirements.

3.10 Environmental impacts

An analysis of environmental impacts has been conducted by the project participants in PDD. The assessment team has crosschecked the presented information (IRL 7b) hence the project won´t cause transboundary impacts and it was not necessary to carry out an Environmental Impact Study. An official reply from the Ministry of Environment of Korea for the necessity of Environmental Impact Assessment for this proposed project activity on 17/08/2011 (IRL 7a) confirms the correctness of the approach used by the PPs. In conclusion, the PPs have followed the requirements of the host country with regards to addressing environmental impacts.

4 COMMENTS BY PARTIES, STAKEHOLDERS AND NGOS

TÜV SÜD published the project documents on the UNFCCC website and invited comments by affected Parties, stakeholders, and non-governmental organisations during a 30 day period.

All key information gathered is presented in the table bellow.

GSP Comments

website: http://cdm.unfccc.int/Projects/Validation/DB/6TJZFLT03HMWXLX279SK3Q0H4CKONF/view.html	
Starting date of the global stakeholder consultation process: 30/09/2011	
Comment submitted by: None	**Issues raised:** -
Response by TÜV SÜD: -	

5 VALIDATION OPINION

TÜV SÜD has performed a validation of the following proposed CDM project activity:

"Reduction of N_2O emissions from the new nitric acid plant #5 of Hu-Chems Fine Chemical Corp."

Standard auditing techniques have been used for the validation of the project. A methodology-specific protocol for the project has been prepared to conduct the validation process in a transparent and comprehensive manner.

The review of the project design documentation, subsequent follow-up interviews, and further verification of references have provided TÜV SÜD with sufficient evidence to determine the fulfilment of stated criteria in the protocol. In the opinion of TÜV SÜD, the project meets all relevant UNFCCC requirements for the CDM if the underlying assumptions do not change. TÜV SÜD recommends the project for registration by the CDM Executive Board.

An analysis, as provided by the applied methodology, demonstrates that the proposed project activity is not a likely baseline scenario. Emission reductions attributable to the project are additional to any that would occur in the absence of the project activity. Considering that the project will be implemented as designed, the project is likely to achieve the estimated amount of emission reductions of 338,990 tCO_2e (annual average over the crediting period) and a total estimated of 3,389,898 tCO_2e over crediting years as specified within the final PDD version.

The validation has been performed following the requirements of the latest version of the CDM VVM and on the basis of the contractual agreement. The single purpose of this report is its use during the registration process as part of the CDM project cycle. Based on the work described in this report, nothing has come to our attention that causes us to believe that any project component or issue has not been covered by the validation process.

Munich, 03/07/2012	Munich, 03/07/2012
Certification Body "climate and energy" TÜV SÜD Industrie Service GmbH	Assessment Team Leader

Annex 1

Validation Protocol

CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PDD in GSP	Final PDD
A. General description of project activity				
A.1. Title of the project activity				
A.1.1. Does the used project title clearly enable to identify the unique CDM activity?		Yes. The title "Reduction of N2O emissions from the new nitric acid plant #5 of Hu-Chems Fine Chemical Corp." enable to clearly identify the project activity.	☑	☑
A.1.2. Are there any indication concerning the revision number and the date of the revision?		Yes the PDD is equipped with version number and date according to the latest PDD template.	☑	☑
A.1.3. Is this consistent with the time line of the project's history?	IRL4	Yes the version number and date is consistent with the timeline of the project history as the as the project history presented during onsite audit is the following: **18.08.2010** Internal Approval - Decision of the Board - Nitrc Acid Plant (IRL 4a) **20.10.2010** License Agreement between HuChems and Uhde Basic Engineering for the Nitric Acid Plant (IRL 4b) **20.10.2010** Critical Equipment Sales Agreement - including EnviNOx Ready System (Selective Catalytic Reduction (SCR) DeNOx System, no N2O catalyst included)) (IRL 4c) **October 2010** Supplementary agreement for option of EnviNOx upgrade system" with Uhde GmbH (IRL 4d) - prices are valid until 31 October 2011 - Option valid until February 28 2013 **03.06.2011** ACM0019 approved **22.08.2011** Effective Date of Service Agreement bewteen Carbon CDM Korea and HuChems (IRL 4g) **08.09.2011** Yeosu City Approval Construction Approval (IRL 4f)	☑	☑

CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PDD in GSP	Final PDD
		30.09.2011 Global stakeholder process started by publishing the PDD for stakeholder comments at UNFCCC **05.10.2011** Approval for Land usage from Korea Industrial Complex Corporation(IRL 4e)		
A.2. Description of the project activity				
A.2.1. Is the description delivering a transparent overview of the project activities?		Yes. The purpose of the proposed project activity is to significantly reduce N2O emissions from the production of nitric acid at the new nitric acid plant #5 of Hu-Chems Fine Chemical Corp. in Yeosu, Republic of Korea by catalytic destruction in a tertiary N_2O abatement facility. The tertiary abatement facility includes a catalyst to destroy N2O that will be operated without the use of fossil fuels..	☑	☑
A.2.2. What proofs are available demonstrating that the project description is in compliance with the actual situation or planning?		For the erection of the new nitric acid plant following evidences have been provided to the audit team. - Internal Approval - Decision of the Board - Nitrc Acid Plant (IRL 4a) - License Agreement between HuChems and Uhde Basic Engineering for the Nitric Acid Plant (IRL 4b) - Yeosu City Approval Construction Approval (IRL 4f) - Approval for Land usage from Korea Industrial Complex Corporation(IRL 4e) For the proposed project activity: - Supplementary agreement for option of EnviNOx upgrade system" (DeN2O) with Uhde GmbH (IRL 4d) - Effective Date of Service Agreement bewteen Carbon CDM Korea and HuChems (IRL 4g) Furthermore the audit team inspected the construction site for the new nitric acid plant where currently the foundation was under	☑	☑

CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PDD in GSP	Final PDD
		construction. PPs presented a time schedule for construction of the nitric acid plant during onsite meeting which shows an expected start of operation of the new nitric acid plant in September 2012 (date for mechanical completion is end of August 2012 as confirmed by EPC Contractor (IRL 4l).		
A.2.3. Is the information provided by these proofs consistent with the information provided by the PDD?		The information was found to be consistent except the following issue: **Corrective Action Request No.1.** The estimation of emission reduction presented in PDD is not consistent with the actual situation found onsite as the start of operation of the new nitric acid plant is expected to be in September 2012 according to HuChems time schedule presented during onsite meeting. The PDD considers already emission reductions from July 2012. Please correct the PDD to be consistent with the actual planning.	CAR	☑
A.2.4. Is all information presented consistent with details provided by further chapters of the PDD?		Yes it is.	☑	☑
A.3. Project participants				
A.3.1. Is the form required for the indication of project participants correctly applied?		Yes it is.	☑	☑
A.3.2. Is the participation of the listed entities or Parties confirmed by each one of them?		**Clarification Request No. 1.** The project activity must comply with the requirements of paragraph 37 of the CDM modalities and procedures. Hence please provide Letter of Approvals from all parties involved in this project activity and a MoC.	CR	

CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PDD in GSP	Final PDD
A.3.3. Is all information on participants / Parties provided in consistency with details provided by further chapters of the PDD (in particular annex 1)?		The information on participants / Parties provided in the PDD is consistent.	☑	
A.4. Technical description of the project activity				
A.4.1. Location of the project activity				
A.4.1.1. Does the information provided on the location of the project activity allow for a clear identification of the site(s)?		Yes the project location is Hu-Chems Fine Chemical Corp., 7-6, Wollae-dong, Yeosu-si, Jeonnam, Republic of Korea **Corrective Action Request No.2.** During onsite visit the audit team visited the construction site for new nitric acid plant where the proposed CDM project is going to be implemented. During this visit PPs checked GPS coordinates. A slight deviation to the information presented in the PDD was found. Please correct the PDD and provide accurate GPS coordinates.	CAR	☑
A.4.1.2. How is it ensured and/or demonstrated, that the project proponents can implement the project at this site (ownership, licenses, contracts etc.)?		HuChems got approval to use the land to construct a new nitric acid plant. This is evidenced by - Yeosu City Approval Construction Approval (IRL 4f) - Approval for Land usage from Korea Industrial Complex	☑	☑

CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PDD in GSP	Final PDD
		Corporation(IRL 4e) The proposed CDM project activity includes the installation of tertiary N2O abatement catalyst at this new nitric acid plant.		
A.4.2. Category(ies) of project activity				
A.4.2.1. To which category(ies) does the project activity belonging to? Is the category correctly identified and indicated?		The project is Scope 05 Chemical Industry, which is also correctly stated in the PDD.	☑	☑
A.4.3. Technology to be employed by the project activity				
A.4.3.1. Does the technical design of the project activity reflect current good practices?	IRL 7b	Yes. Tertiary abatement facilities at nitric acid plants are considered as best available technology. It is expected, that about 96% of N2O emissions are destroyed by the tertiary abatement facility.	☑	☑
A.4.3.2. Does the description of the technology to be applied provide sufficient and transparent input/ information to evaluate its impact on the greenhouse gas balance?		Yes it does. It is expected, that about 96% of N2O emissions are destroyed by the tertiary abatement facility and no fossil fuel is used.	☑	☑
A.4.3.3. Does the implementation of the project activity require any technology transfer from annex-I-countries to the host country(ies)?	IRL 4d	Yes it does. The technology should be provided by UHDE GmbH located in Germany.	☑	☑
A.4.3.4. Is the technology implemented by the project activity environmentally safe?	IRL 7b	Yes. Tertiary abatement facilities at nitric acid plants are considered as best available technology.	☑	☑
A.4.3.5. Is the information provided in compliance with actual situation or planning?		Yes it is.	☑	☑
A.4.3.6. Does the project use state of the art technology and / or does the technology result in a significantly better perform-	IRL 7b	Yes. Tertiary abatement facilities at nitric acid plants are considered as best available technology.	☑	☑

CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PDD in GSP	Final PDD
ance than any commonly used technologies in the host country?				
A.4.3.7. Is the project technology likely to be substituted by other or more efficient technologies within the project period?		No. It is expected, that about 96% of N2O emissions are destroyed by the tertiary abatement facility.	☑	☑
A.4.3.8. Does the project require extensive initial training and maintenance efforts in order to be carried out as scheduled during the project period?		HuChems is already successfully operating three tertiary N2O abatement facilities as CDM project (UNFCCC 0765-CDMP) at other nitric acid production plants located at the complex. This shows that PPs are already well experienced in operation of such facilities.	☑	☑
A.4.3.9. Is information available on the demand and requirements for training and maintenance?		Plans are not yet established. However - see above - HuChems is already experienced in operating N2O abatement systems.	☑	☑
A.4.3.10. Is a schedule available for the implementation of the project and are there any risks for delays?		Yes, a schedule has been presented by the PPs during onsite visit. Hence the nitric acid plant is expected to start operation in September 2012. The risk for delays in the proposed project activity is mainly connected to the commissioning of the new nitric acid plant. The critical issue is the transport of the reactor to South Korea via ship. The date for mechanical completion is end of August 2012 as confirmed by EPC Contractor (IRL 4l).	☑	☑
A.4.4. Estimated amount of emission reductions over the chosen crediting period				
A.4.4.1. Is the form required for the indication of projected emission reductions correctly applied?		Yes it is.	☑	☑
A.4.4.2. Are the figures provided consistent with other data presented in the PDD?		Yes. However see Finding under A.2.3.	☑	☑
A.4.5. Public funding of the project activity				
A.4.5.1. Is the information provided on public		The project will not use any public funding as stated in the PDD	☑	☑

CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PDD in GSP	Final PDD
funding provided in compliance with the actual situation or planning as available by the project participants?				
A.4.5.2. Is all information provided consistent with the details given in remaining chapters of the PDD (in particular annex 2)?		The information provided in Annex 2 is consistent. No public funds are used for the financing of the project activity.	☑	☑
B. Application of a baseline and monitoring methodology				
B.1. Title and reference of the approved baseline and monitoring methodology				
B.1.1.1. Are reference number, version number, and title of the baseline and monitoring methodology clearly indicated?		Yes the PDD clearly indicates reference number, version number and title of the baseline and monitoring methodology. The PDD is based on the approved consolidated baseline and monitoring methodology ACM0019 “N2O abatement from nitric acid production” (Version 01.0.0).	☑	☑
B.1.1.2. Is the applied version the most recent one and / or is this version still applicable?	IRL 2a	Yes it is. No revisions are currently available for the applied methodology and it is applicable.	☑	☑
B.2. Justification of the choice of the methodology and why it is applicable to the project activity				
B.2.1. Is the applied methodology considered the most appropriate one?		Yes, it is the only methodology currently available for N2O destruction project at new nitric acid production plants.	☑	☑
Integrate the required amount of sub-checklists on the applicability criteria as given by the applied methodology and comment on at least every line answered with “No”;				
B.2.2. Criterion 1: The methodology applies to project activities that introduce N2O abatement measures in nitric acid plants	IRL 4a IRL 4d IRL1	Applicability checklist / Yes / No Criterion discussed in the PDD? / Yes Compliance provable? / Yes Compliance verified? / Yes	☑	☑

<table>
<tr><th>CHECKLIST TOPIC / QUESTION</th><th>Ref.</th><th>COMMENTS</th><th>PDD in GSP</th><th>Final PDD</th></tr>
<tr><td></td><td></td><td>The proposed project activity destroys N2O emissions by the reduction of N2O in the tail gas stream of the nitric acid plant #5 of Hu-Chems (tertiary abatement technology).
The “License Agreement between HuChems and Uhde Basic Engineering for the Nitric Acid Plant” (IRL 4b) that confirms the engineering of the new nitric acid plant.
The CDM project activity foresees the installation of a tertiary N2O abatement system. (IRL 1, IRL 4d)</td><td></td><td></td></tr>
<tr><td>B.2.3. Criterion 2: In the case that the nitric acid plant started commercial operation before the implementation of the CDM project activity, the project participants shall demonstrate that there was no secondary or tertiary abatement technology installed in the respective nitric acid plant</td><td>IRL 4a, IRL 4e</td><td><table><tr><th>Applicability checklist</th><th>Yes / No</th></tr><tr><td>Criterion discussed in the PDD?</td><td>Yes</td></tr><tr><td>Compliance provable?</td><td>Yes</td></tr><tr><td>Compliance verified?</td><td>Yes</td></tr></table>
The nitric acid plant #5 of Hu-Chems has not started commercial production yet. This has been verified by inspection of the construction site during onsite visit. The project is scheduled to start commercial operation not before September 2012 together with the proposed CDM project activity. The date for mechanical completion is end of August 2012 as confirmed by EPC Contractor (IRL 4l).</td><td>☑</td><td>☑</td></tr>
<tr><td>B.2.4. Criterion 3: Continuous real-time measurements of the N2O concentration and the total gas volume flow can be carried out in the tail gas stream after the abatement of N2O emissions throughout the crediting period of the project activity.</td><td>IRL 4d</td><td><table><tr><th>Applicability checklist</th><th>Yes / No</th></tr><tr><td>Criterion discussed in the PDD?</td><td>Yes</td></tr><tr><td>Compliance provable?</td><td>Yes</td></tr><tr><td>Compliance verified?</td><td>Yes</td></tr></table>
Continuous real-time measurements of the N2O concentration</td><td>CR</td><td>☑</td></tr>
</table>

CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PDD in GSP	Final PDD
		can be carried out in the tail gas stream after the abatement of N2O emissions throughout the crediting period of the project activity (IRL 4d) **Clarification Request No. 2.** Please provide any evidence that the measurement of total gas volume flow can be carried out in the tail gas stream after the abatement of N2O emissions throughout the crediting period of the project activity.		
B.2.5. Criterion 4: No law or regulation which mandates the complete or partial destruction of N2O from nitric acid plants exists in the host country where the CDM project activity is implemented.	IRL 10a IRL 10b	Applicability checklist / Yes / No Criterion discussed in the PDD? Yes Compliance provable? Yes Compliance verified? Yes HuChems is among 470 companies which have been designated as mandatory participants in the Greenhouse Gas and Energy Target Scheme. The designation is based on the “Framework Act on Low Carbon, Green Growth”, which came into effect on April 14, 2010 and “Guidelines on designation and management of companies for greenhouse gas reduction target management (Notification No 2010-109 of the Ministry of Environment on August 30, 2010)”. The scheme was made to impose the target for greenhouse gas emission as well as energy use to controlled companies and check on manage their achievements. **Clarification Request No. 3.** The project activity will be implemented at the HuChems 5 nitric acid plant which is expected to start operation in September 2012. PPs are requested to clearly clarify the legal situation in regard of	CR	☑

<table>
<tr><th>CHECKLIST TOPIC / QUESTION</th><th>Ref.</th><th>COMMENTS</th><th>PDD in GSP</th><th>Final PDD</th></tr>
<tr><td></td><td></td><td>any mandatory complete or partial N2O destruction for nitric acid production at HuChems plant 5 in respect of the legal situation of the host country. In doing so clear evidence shall be provided that there is no law or regulation which mandates the complete or partial destruction of N2O from nitric acid plants existing in the South Korea as required by the applicability conditions of the applied methodology.
.</td><td></td><td></td></tr>
<tr><td colspan="5">B.3. Description of the sources and gases included in the project boundary</td></tr>
<tr><td colspan="5">Integrate the required amount of sub-checklists for sources and gases as given by the methodology applied and comment on at least every line answered with “No”</td></tr>
<tr><td>B.3.1. Source:
NH3 oxidation at the primary catalyst gauze
Gas(es): N2O
Type: Baseline Emissions</td><td></td><td><table><tr><th>Boundary checklist</th><th>Yes / No</th></tr><tr><td>Source and gas(es) discussed in the PDD?</td><td>Yes</td></tr><tr><td>Inclusion / exclusion justified?</td><td>Yes</td></tr><tr><td>Explanation / Justification sufficient?</td><td>Yes</td></tr><tr><td>Consistency with monitoring plan?</td><td>Yes</td></tr></table>
This is a main emission source and included in PDD according to applied methodology.</td><td>☑</td><td>☑</td></tr>
<tr><td>B.3.2. Source:
NH3 oxidation at the primary catalyst gauze
Gas(es): N2O
Type: Project Emissions</td><td></td><td><table><tr><th>Boundary checklist</th><th>Yes / No</th></tr><tr><td>Source and gas(es) discussed in the PDD?</td><td>Yes</td></tr><tr><td>Inclusion / exclusion justified?</td><td>Yes</td></tr><tr><td>Explanation / Justification sufficient?</td><td>Yes</td></tr><tr><td>Consistency with monitoring plan?</td><td>Yes</td></tr></table></td><td>☑</td><td>☑</td></tr>
</table>

<table>
<tr><th>CHECKLIST TOPIC / QUESTION</th><th>Ref.</th><th>COMMENTS</th><th>PDD in GSP</th><th>Final PDD</th></tr>
<tr><td></td><td></td><td>This is a main emission source and included in PDD according to applied methodology.</td><td></td><td></td></tr>
<tr><td>B.3.3. Source:
Operation of a tertiary N2O Abatement facility
Gas(es): CO2,
Type: Project Emissions</td><td></td><td><table><tr><th>Boundary checklist</th><th>Yes / No</th></tr><tr><td>Source and gas(es) discussed in the PDD?</td><td>Yes</td></tr><tr><td>Inclusion / exclusion justified?</td><td>Yes</td></tr><tr><td>Explanation / Justification sufficient?</td><td>Yes</td></tr><tr><td>Consistency with monitoring plan?</td><td>Yes</td></tr></table>
As mentioned in the methodology in some cases, fossil fuels are used as reducing agent and/or for decomposing the tail gas as part of a tertiary N2O abatement In some cases, fossil fuels are used as reducing agent and/or for decomposing the tail gas as part of a tertiary N2O abatement.
PPs justified in the PDD that no fossil fuels are used for the operation of the N2O abatement facility and hence, emissions from this source ares considered zero.</td><td>☑</td><td>☑</td></tr>
<tr><td>B.3.4. Source:
Operation of a tertiary N2O Abatement facility
Gas(es): N2O,
Type: Project Emissions</td><td></td><td><table><tr><th>Boundary checklist</th><th>Yes / No</th></tr><tr><td>Source and gas(es) discussed in the PDD?</td><td>Yes</td></tr><tr><td>Inclusion / exclusion justified?</td><td>Yes</td></tr><tr><td>Explanation / Justification sufficient?</td><td>Yes</td></tr><tr><td>Consistency with monitoring plan?</td><td>Yes</td></tr></table>
The methodology requires to include any N2O by-pass streams</td><td>☑</td><td>☑</td></tr>
</table>

CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PDD in GSP	Final PDD
		for tertiary abatement facilities. However please refer to CR 05.		
B.3.5. Do the spatial and technological boundaries as verified on-site comply with the discussion provided by / indication included to the PDD?		Yes.	☑	☑
B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario				
B.4.1. Are there any regulations requiring the abatement of N2O emissions at HuChems 5 plant?		HuChems is among 470 companies which have been designated as mandatory participants in the Greenhouse Gas and Energy Target Scheme. The designation is based on the "Framework Act on Low Carbon, Green Growth", which came into effect on April 14, 2010 and "Guidelines on designation and management of companies for greenhouse gas reduction target management (Notification No 2010-109 of the Ministry of Environment on August 30, 2010)". The scheme was made to impose the target for greenhouse gas emission as well as energy use to controlled companies and check on manage their achievements. **Corrective Action Request No.3.** The PDD shall identify the baseline for the proposed CDM project activity, defined as the scenario that reasonably represents the anthropogenic emissions by sources of GHGs that would occur in the absence of the proposed CDM project activity. (VVM para 81). PPs defined the baseline scenario without any identification or consideration of relevant policies and circumstances which is required by decision 3/CMP.1, annex, paragraph 45.	CAR	☑
B.4.2. Does the operator of the nitric acid plant has no economic incentives to take any		**Clarification Request No. 4.** PPs shall clarify why the operator of the new nitric acid plant	CR	☑

CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PDD in GSP	Final PDD
N2O abatement measures because this entails capital and operating costs but no financial benefits.		which is expected to start operation in September 2012 has no economic incentive to take any N2O abatement measures. In doing so relevant policies and circumstances shall be considered.		
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):				
B.5.1. Are there any regulations requiring the abatement of N2O emissions at HuChems 5 plant?		See B.4.1	☑	☑
B.5.2. Does the operator of the nitric acid plant has no economic incentives to take any N2O abatement measures because this entails capital and operating costs but no financial benefits.		See B.4.2	☑	☑
B.5.3. Is the implementation timeline, including the CDM consideration clearly presented in the PDD?		In accordance with EB62 Annex 13 a notification is not necessary if a project design document (PDD) has been published for global stakeholder consultation before the project activity start date The project starting date defined in PDD for GSP is early 2012. However please refer to Finding under C.1.1.	☑	☑
B.6. Emissions reductions				
B.6.1. Explanation of methodological choices				
B.6.1.1. Is it explained how the procedures provided in the methodology are applied by the proposed project activity?		Yes it is. As requested by the applied methodology ACM0019 version 01.0.0 the “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (Version 2.0.0) is applied. The applied methodology also stipulates that the “Tool to calculate project or leakage CO2 emissions from fossil fuel combustion” is to be used when determining emissions from fossil fuel use in a tertiary abatement facility. Due to the fact, that no fossil	☑	☑

CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PDD in GSP	Final PDD
		fuels are used for the operation of the N2O abatement facility in the project activity, this tool is not applicable to the project activity.		
B.6.1.2.Is every selection of options offered by the methodology correctly justified and is this justification in line with the situation verified on-site?	IRL 2f IRL 6b IRL 6c	The applied methodology ACM0019 version 01.0.0 is applicable for secondary and tertiary N2O abatement systems. The project activity includes a tertiary system. This is clearly described in the PDD. In case the project activity introduces tertiary N2O abatement, then the methodology requires that any remaining N2O emissions from the project plant and CO2 emissions arising from the operation of the tertiary abatement system are included as project emissions in the project boundary. In regard to CO2 emission the technology which will be applied does not use any fossil fuels. Hence PPs justifies that emissions from this source are considered to be zero as process works very well at temperatures above about 425°C and expected level of tail gas temperature are in this range. As checked by the audit team this is in accordance with the PFD of Hu Chems 5 plant (IRL 6b) The methodology requires to use the latest approved version of the tool: “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” The latest version is Version 2.0.0 which is applied according to PDD, The tool covers the possible measurement combinations, providing six different calculation options to determine the mass flow of a particular greenhouse gas (Option A to F).PPs justified to use Option A as based on the currently available information Option A (measurement options for option A: volume flow of gaseous stream on dry basis, volumetric fraction on dry or wet basis) of the tool will be applied, which states two ways how to demonstrate that the gaseous stream is dry. These are: a) Measure the moisture content of the gaseous stream	☑	☑

CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PDD in GSP	Final PDD
		(CH2O,t,db,n) and demonstrate that this is less or equal to 0.05 kg H2O/m³ dry gas; or b) Demonstrate that the temperature of the gaseous stream (Tt) is less than 60°C (333.15 K) at the flow measurement point. The ex-ante determination of the moisture content at the measuring point according to process parameters shows a value of about 0.003 kgH2O/m3 dry gas. Hence Option A is applicable. The validation team reviewed this ex-ante determination and verified the input parameters which were found to be consistent with the PFD of the proposed project activity. Moreover as mentioned in the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 2.0.0)" the assumption that the gaseous stream is dry is conservative for the situation that the N2O is overestimated (calculating project emissions).		
B.6.1.3.Are the formulae required for the determination of project emissions correctly presented, enabling a complete identification of parameter to be used and / or monitored?		Yes, the formulas for the determination of project emissions are correctly presented. Methodology: $PE_n = PE_{N2O,n} + PE_{CO2,tertiary,n}$ PDD: $PE_n = PE_{N2O,n} + PE_{CO2,tertiary,n}$	☑	☑
B.6.1.4.Are the formulae required for the determination of baseline emissions correctly presented, enabling a complete identification of parameter to be used		Yes, the formulas for the determination of baseline emissions are correctly presented. Methodology:	☑	☑

CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PDD in GSP	Final PDD
and / or monitored?		$BE_n = P_{NA,n} \times EF_{BL,N2O,n} \times GWP_{N2O} \times 10^{-3}$ PDD: $BE_n = P_{NA,n} * EF_{BL,N2O,n} * GWP_{N2O} * 10^{-3}$		
B.6.1.5.Are the formulae required for the determination of leakage emissions correctly presented, enabling a complete identification of parameter to be used and / or monitored?		According to the applied methodology ACM0019 version 01.0.0 any leakage emissions sources are deemed to be negligible.	☑	☑
B.6.1.6.Are the formulae required for the determination of emission reductions correctly presented?		Yes, the formulas for the determination of emission reductions are correctly presented. Methodology: $ER_n = BE_n - PE_n$ PDD: $ER_n = BE_n - PE_n$	☑	☑
B.6.2. Data and parameters that are available at validation				
B.6.2.1.Is the list of parameters presented in chapter B.6.2 considered to be complete with regard to the requirements of the applied methodology?		Yes the list of parameters presented in chapter B.6.2 is considered to be complete with regard to the requirements of the applied methodology.	☑	☑
B.6.2.2.Parameter Title: $EF_{default,y}$		Data Checklist: Yes / No Title in line with methodology? Yes	☑	☑

CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PDD in GSP	Final PDD
		Data unit correctly expressed? Yes Appropriate description of parameter? Yes Source clearly referenced? Yes Correct value provided? Yes Has this value been verified? Yes Choice of data correctly justified? Yes Measurement method correctly described? n.a. This is a default N2O baseline emissions factor in the calendar year y of the monitoring period n specified in the applied methodology ACM0019 version 01.0.0. The values applied in the PDD are consistent with the methodology as checked by the validator.		
B.6.2.3.Parameter Title: GWP_{N2O}		Data Checklist: Yes / No Title in line with methodology? Yes Data unit correctly expressed? Yes Appropriate description of parameter? Yes Source clearly referenced? Yes Correct value provided? Yes Has this value been verified? Yes Choice of data correctly justified? Yes Measurement method correctly described? n.a. The correct value of global warming potential of N2O is appied according to relevant decisions by the CMP (Decision 2/CP.3 Methodological issues related to the Kyoto protocol (FCCC/CP/1997/7/Add.1)).	☑	☑
B.6.2.4.Parameter Title: R_u from the “Tool to determine the mass		Data Checklist: Yes / No	☑	☑

<table>
<tr><th>CHECKLIST TOPIC / QUESTION</th><th>Ref.</th><th>COMMENTS</th><th>PDD in GSP</th><th>Final PDD</th></tr>
<tr><td>flow of a greenhouse gas in a gaseous stream” (Version 02.0.0)</td><td></td><td><table><tr><td>Title in line with methodology?</td><td>Yes</td></tr><tr><td>Data unit correctly expressed?</td><td>Yes</td></tr><tr><td>Appropriate description of parameter?</td><td>Yes</td></tr><tr><td>Source clearly referenced?</td><td>Yes</td></tr><tr><td>Correct value provided?</td><td>Yes</td></tr><tr><td>Has this value been verified?</td><td>Yes</td></tr><tr><td>Choice of data correctly justified?</td><td>Yes</td></tr><tr><td>Measurement method correctly described?</td><td>n.a.</td></tr></table>
This is the universal ideal gases constant specified in the applied Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (Version 02.0.0). The value applied in the PDD is consistent with the tool as checked by the validator.</td><td></td><td></td></tr>
<tr><td>B.6.2.5.Parameter Title:
MM_i
from the “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (Version 02.0.0)</td><td></td><td><table><tr><th>Data Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>Yes</td></tr><tr><td>Data unit correctly expressed?</td><td>Yes</td></tr><tr><td>Appropriate description of parameter?</td><td>Yes</td></tr><tr><td>Source clearly referenced?</td><td>Yes</td></tr><tr><td>Correct value provided?</td><td>Yes</td></tr><tr><td>Has this value been verified?</td><td>Yes</td></tr><tr><td>Choice of data correctly justified?</td><td>Yes</td></tr><tr><td>Measurement method correctly described?</td><td>n.a.</td></tr></table>
This is the Molecular mass of greenhouse gas specified in the applied Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (Version 02.0.0). The value applied in the PDD</td><td>☑</td><td>☑</td></tr>
</table>

CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PDD in GSP	Final PDD
		is consistent with the tool as checked by the validator.		
B.6.3. Ex-ante calculation of emission reductions				
B.6.3.1. Is the projection based on the same procedures as used for future monitoring?		The same procedure is applied using estimations for parameters which will be monitored later.	☑	☑
B.6.3.2. Are the GHG calculations documented in a complete and transparent manner?		Yes the estimation of emission reductions is calculated in complete and transparent manner in Emission reduction calculation tool “HUC#5_ERModel_ACM0019” and transparently documented in PDD section B 6.3	☑	☑
B.6.3.3. Is the data provided in this section consistent with data as presented in other chapters of the PDD?		Yes it is.	☑	☑
B.6.4. Summary of the ex-ante estimation of emission reductions				
B.6.4.1. Will the project result in fewer GHG emissions than the baseline scenario?		Yes as found in PDD published for GSP.	☑	☑
B.6.4.2. Is the form/table required for the indication of projected emission reductions correctly applied?		Yes it is.	☑	☑
B.6.4.3. Is the projection in line with the envisioned time schedule for the project’s implementation and the indicated crediting period?		Please refer to finding under A.2.3.	CAR	☑
B.6.4.4. Is the data provided in this section in consistency with data as presented in other chapters of the PDD?		Yes it is.	☑	☑

<table>
<tr><th>CHECKLIST TOPIC / QUESTION</th><th>Ref.</th><th>COMMENTS</th><th>PDD in GSP</th><th>Final PDD</th></tr>
<tr><td colspan="5">B.7. Application of the monitoring methodology and description of the monitoring plan</td></tr>
<tr><td colspan="5">B.7.1. Data and parameters monitored</td></tr>
<tr><td>B.7.1.1.Is the list of parameters presented in chapter B.7.1 considered to be complete with regard to the requirements of the applied methodology?</td><td></td><td>Yes, the list of parameters presented in chapter B.7.1 is considered to be complete with regard to the requirements of the applied methodology</td><td>☑</td><td>☑</td></tr>
<tr><td colspan="5">Integrate the required amount of sub-checklists for monitoring parameter and comment on any line answered with “No”</td></tr>
<tr><td>B.7.1.2.Parameter Title:
$P_{NA,n}$</td><td></td><td>
<table>
<tr><th>Monitoring Checklist</th><th>Yes / No</th></tr>
<tr><td>Title in line with methodology?</td><td>Yes</td></tr>
<tr><td>Data unit correctly expressed?</td><td>Yes</td></tr>
<tr><td>Appropriate description of parameter?</td><td>Yes</td></tr>
<tr><td>Source clearly referenced?</td><td>Yes</td></tr>
<tr><td>Correct value provided for estimation?</td><td>Yes</td></tr>
<tr><td>Has this value been verified?</td><td>Yes</td></tr>
<tr><td>Measurement method correctly described?</td><td>Yes</td></tr>
<tr><td>Correct reference to standards?</td><td>Yes</td></tr>
<tr><td>Indication of accuracy provided?</td><td>No, as no specific instrument selected yet.</td></tr>
<tr><td>QA/QC procedures described?</td><td>Yes</td></tr>
<tr><td>QA/QC procedures appropriate?</td><td>Yes</td></tr>
</table>
<u>Corrective Action Request No.4.</u>
The source of data described in PDD for parameter $P_{NA,n}$ is not consistent with the applied methodology. Please describe the</td><td>CAR</td><td>☑</td></tr>
</table>

<table>
<tr><th>CHECKLIST TOPIC / QUESTION</th><th>Ref.</th><th>COMMENTS</th><th>PDD in GSP</th><th>Final PDD</th></tr>
<tr><td></td><td></td><td>source of data to be used more accurately.

Values for nitric acid produced in the monitoring period used for estimation of emission reduction has been verified with the design capacity stated in the License Agreement between HuChems and Uhde Basic Engineering for the Nitric Acid Plant (IRL 4b) and achieved annual operating days achieved at HuChems IV plant using similar technology operated by Hu-Chems Fine Chemical Corp. Hence the value was found to be plausible.</td><td></td><td></td></tr>
<tr><td>B.7.1.3.Parameter Title:
h_n</td><td></td><td><table>
<tr><th>Monitoring Checklist</th><th>Yes / No</th></tr>
<tr><td>Title in line with methodology?</td><td>Yes</td></tr>
<tr><td>Data unit correctly expressed?</td><td>Yes</td></tr>
<tr><td>Appropriate description of parameter?</td><td>Yes</td></tr>
<tr><td>Source clearly referenced?</td><td>Yes</td></tr>
<tr><td>Correct value provided for estimation?</td><td>Yes</td></tr>
<tr><td>Has this value been verified?</td><td>Yes</td></tr>
<tr><td>Measurement method correctly described?</td><td>Yes</td></tr>
<tr><td>Correct reference to standards?</td><td>Yes</td></tr>
<tr><td>Indication of accuracy provided?</td><td>No, as no specific instrument selected yet.</td></tr>
<tr><td>QA/QC procedures described?</td><td>Yes</td></tr>
<tr><td>QA/QC procedures appropriate?</td><td>Yes</td></tr>
</table></td><td>CAR</td><td>☑</td></tr>
</table>

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<tr><th>CHECKLIST TOPIC / QUESTION</th><th>Ref.</th><th>COMMENTS</th><th>PDD in GSP</th><th>Final PDD</th></tr>
<tr><td></td><td></td><td><u>Corrective Action Request No.5.</u>
The description of monitoring parameters should not be simply copied from methodology. Please refer to PDD guide (EB41 Annex 12) for any guidance of information which need to be stated here as the section B.7.1 of PDD shall include specific information on how the data and parameters that need to be monitored would actually be collected during monitoring for the project activity.
Where data or parameters are supposed to be measured, specify the measurement methods and procedures, including a specification which accepted industry standards or national or international standards will be applied, which measurement equipment is used, how the measurement is undertaken, which calibration procedures are applied, what is the accuracy of the measurement method, who is the responsible person/entity that should undertake the measurements and what is the measurement interval.</td><td></td><td></td></tr>
<tr><td>B.7.1.4.Parameter Title:
$T_{open,n}$</td><td></td><td><table><tr><th>Monitoring Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>Yes</td></tr><tr><td>Data unit correctly expressed?</td><td>Yes</td></tr><tr><td>Appropriate description of parameter?</td><td>Yes</td></tr><tr><td>Source clearly referenced?</td><td>Refer to CR05</td></tr><tr><td>Correct value provided for estimation?</td><td>Yes</td></tr><tr><td>Has this value been verified?</td><td>Refer to CR05</td></tr><tr><td>Measurement method correctly described?</td><td>Refer to CR05</td></tr><tr><td>Correct reference to standards?</td><td>Refer to CR05</td></tr></table></td><td>CAR
CR</td><td>☑</td></tr>
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<tr><td>Indication of accuracy provided?</td><td>Refer to CR05</td></tr>
<tr><td>QA/QC procedures described?</td><td>Refer to CR05</td></tr>
<tr><td>QA/QC procedures appropriate?</td><td>Refer to CR05</td></tr>
</table>

See Finding in above section B.7.1.3.

<u>Clarification Request No. 5.</u>
PPs assume that the amount of N2O released through the by-pass to a tertiary N2O abatement system to the atmosphere (QN2O,by-pass,n) is zero. Please provide a clear justification for this assumption in the PDD.
Furthermore PPs mentions that the by-pass valve shall be calibrated regularly to industry standards. Please clarify the relevant standard and provide specific information in the PDD.</td><td></td><td></td></tr>
<tr><td>B.7.1.5.Parameter Title:
$V_{t,db}$</td><td></td><td>
<table>
<tr><th>Monitoring Checklist</th><th>Yes / No</th></tr>
<tr><td>Title in line with methodology?</td><td>Yes</td></tr>
<tr><td>Data unit correctly expressed?</td><td>Yes</td></tr>
<tr><td>Appropriate description of parameter?</td><td>Yes</td></tr>
<tr><td>Source clearly referenced?</td><td>Yes</td></tr>
<tr><td>Correct value provided for estimation?</td><td>Yes</td></tr>
<tr><td>Has this value been verified?</td><td>Yes</td></tr>
<tr><td>Measurement method correctly described?</td><td>Yes</td></tr>
<tr><td>Correct reference to standards?</td><td>Yes</td></tr>
<tr><td>Indication of accuracy provided?</td><td>No, as no specific in-</td></tr>
</table>
</td><td>CAR</td><td>☑</td></tr>
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<tr><td></td><td></td><td>
<table>
<tr><td></td><td>strument selected yet.</td></tr>
<tr><td>QA/QC procedures described?</td><td>Yes</td></tr>
<tr><td>QA/QC procedures appropriate?</td><td>Yes</td></tr>
</table>
See Finding in above section B.7.1.3.
</td><td></td><td></td></tr>
<tr><td>B.7.1.6.Parameter Title:
$v_{i,t,db}$</td><td></td><td>
<table>
<tr><th>Monitoring Checklist</th><th>Yes / No</th></tr>
<tr><td>Title in line with methodology?</td><td>Yes</td></tr>
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<tr><td>Source clearly referenced?</td><td>Yes</td></tr>
<tr><td>Correct value provided for estimation?</td><td>Yes</td></tr>
<tr><td>Has this value been verified?</td><td>Yes</td></tr>
<tr><td>Measurement method correctly described?</td><td>Yes</td></tr>
<tr><td>Correct reference to standards?</td><td>Yes</td></tr>
<tr><td>Indication of accuracy provided?</td><td>No, as no specific instrument selected yet.</td></tr>
<tr><td>QA/QC procedures described?</td><td>Yes</td></tr>
<tr><td>QA/QC procedures appropriate?</td><td>Yes</td></tr>
</table>
See Finding in above section B.7.1.3.
</td><td>CAR</td><td>☑</td></tr>
<tr><td>B.7.1.7.Parameter Title:
$C_{H2O,t,db,n}$</td><td></td><td>
<table>
<tr><th>Monitoring Checklist</th><th>Yes / No</th></tr>
<tr><td>Title in line with methodology?</td><td>Yes</td></tr>
<tr><td>Data unit correctly expressed?</td><td>Yes</td></tr>
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<tr><td></td><td></td><td>
<table>
<tr><td>Appropriate description of parameter?</td><td>Yes</td></tr>
<tr><td>Source clearly referenced?</td><td>Yes</td></tr>
<tr><td>Correct value provided for estimation?</td><td>Yes</td></tr>
<tr><td>Has this value been verified?</td><td>Yes</td></tr>
<tr><td>Measurement method correctly described?</td><td>Yes</td></tr>
<tr><td>Correct reference to standards?</td><td>Yes</td></tr>
<tr><td>Indication of accuracy provided?</td><td>Yes</td></tr>
<tr><td>QA/QC procedures described?</td><td>Yes</td></tr>
<tr><td>QA/QC procedures appropriate?</td><td>Yes</td></tr>
</table>
</td><td></td><td></td></tr>
<tr><td>B.7.1.8.Parameter Title:
T_t</td><td></td><td>
<table>
<tr><th>Monitoring Checklist</th><th>Yes / No</th></tr>
<tr><td>Title in line with methodology?</td><td>Yes</td></tr>
<tr><td>Data unit correctly expressed?</td><td>Yes</td></tr>
<tr><td>Appropriate description of parameter?</td><td>Yes</td></tr>
<tr><td>Source clearly referenced?</td><td>Yes</td></tr>
<tr><td>Correct value provided for estimation?</td><td>Yes</td></tr>
<tr><td>Has this value been verified?</td><td>Yes</td></tr>
<tr><td>Measurement method correctly described?</td><td>No, as no specific instrument selected yet.</td></tr>
<tr><td>Correct reference to standards?</td><td>Yes</td></tr>
<tr><td>Indication of accuracy provided?</td><td>No, as no specific instrument selected yet.</td></tr>
</table>
</td><td>CAR</td><td>☑</td></tr>
</table>

CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PDD in GSP	Final PDD
		QA/QC procedures described? Yes QA/QC procedures appropriate? Yes See Finding in above section B.7.1.3.		
B.7.1.9.Parameter Title: P_t		Monitoring Checklist / Yes / No Title in line with methodology? Yes Data unit correctly expressed? Yes Appropriate description of parameter? Yes Source clearly referenced? Yes Correct value provided for estimation? Yes Has this value been verified? Yes Measurement method correctly described? No, as no specific instrument selected yet. Correct reference to standards? Yes Indication of accuracy provided? No, as no specific instrument selected yet. QA/QC procedures described? Yes QA/QC procedures appropriate? Yes See Finding in above section B.7.1.3.	CAR	☑
B.7.2. Description of the monitoring plan				
B.7.2.1.Is the operational and management structure clearly described and in compliance with the envisioned situation?		**Clarification Request No. 6.** EB61 Annex 12 requires to describe the operational and management structure that the project operator will implement in order	CR	☑

CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PDD in GSP	Final PDD
		to monitor emission reductions generated by the project activity. The PDD shall clearly indicate the responsibilities for and institutional arrangements for data collection and archiving.		
B.7.2.2.Are responsibilities and institutional arrangements for data collection and archiving clearly provided?		See Finding above in B.7.2.1.	CR	☑
B.7.2.3.Does the monitoring plan provide current good monitoring practice?		See Finding above in B.7.2.1.	CR	☑
B.7.2.4.If applicable: Does annex 4 provide useful information enabling a better understanding of the envisioned monitoring provisions?		Not applicable.	☑	☑
B.8. Date of completion of the application of the baseline study and monitoring methodology an the name of the responsible person(s)/entity(ies)				
B.8.1.1.Is there any indication of a date when the baseline was determined?		Yes there is. Date of completion of the application of the methodology to the project activity study: 27/09/2011	☑	☑
B.8.1.2.Is this consistent with the time line of the PDD history?		Yes it is. The baseline study was finalised after the local stakeholder meeting.	☑	☑
B.8.1.3.Is the information on the person(s) / entity(ies) responsible for the application of the baseline and monitoring methodology provided consistent with the actual situation?		Yes it is. The entity is Carbon CDM Korea Ltd. a project participant. Also the persons are consistent with the actual situation.	☑	☑
B.8.1.4.Is information provided whether this person / entity is also considered a project participant?		Yes it is. The entity is project participant.	☑	☑

CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PDD in GSP	Final PDD
C. Duration of the project activity / crediting period				
C.1. Duration of the project activity				
C.1.1. Are the project's starting date and operational lifetime clearly defined and reasonable?		The project starting date is stated as "Expected to be in early 2012". This is the date, when the contract with the supplier on the delivery of the N2O abatement facility becomes effective. **Clarification Request No. 7.** The audit team could not find any clear evidence for this date. To confirm this date it is required to provide clear evidence or at least a statement from the proposed N2O catalyst supplier that Hu-Chems has not ordered any catalyst for the proposed CDM activity yet. **Clarification Request No. 8.** Please provide any prove that the expected project lifetime is 25 years as stated in the PDD.	CR	☑
C.2. Choice of the crediting period and related information				
C.2.1. 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)?		The assumed crediting time is assumed to be 10 years. This is found to be reasonable for such kind of project activity. **Corrective Action Request No.6.** Please correct the information under section C.2.2.1. "Expected starting date of first crediting period: 01/07/2012" as this is a fixed crediting period.	CAR	☑

CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PDD in GSP	Final PDD
D. Environmental impacts				
D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts				
D.1.1. Has the analysis of the environmental impacts of the project activity been sufficiently described?	IRL 7b	No significant environmental impacts havce to be considered. This has been crosschecked with IRL 7b.	☑	☑
D.1.2. Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, has an EIA been approved?	IRL 7a	No Host Party requirements for an Environmental Impact Assessment exists. This has been confirmed by the Ministry of Environment of Korea	☑	☑
D.1.3. Will the project create any adverse environmental effects?	IRL 7b	No.	☑	☑
D.1.4. Were transboundary environmental impacts identified in the analysis?	IRL 7b	No.	☑	☑
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				
D.2.1. Have the identified environmental impacts been addressed in the project design sufficiently?		n.a.	☑	☑
D.2.2. Does the project comply with environmental legislation in the host country?		n.a.	☑	☑
E. Stakeholders' comments				
E.1. Brief description how comments by local stakeholders have been invited and compiled				
E.1.1. Have relevant stakeholders been consulted?	IRL 8	Local Stakeholder meeting was held on 27/9/2011 in the City Hall of Yeosu. PPs presented an invitation List and newspapers and online news	☑	☑

CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PDD in GSP	Final PDD
		where stakeholder were invated to participate. PPs presented the list of participants. PPs presented invitation cards for personally invited people. PPs submitted news reports of the meeting held (after the meeting). PPs prepared a questionnaire for the meeting. PPs submitted the filled questionnaires. No additional comments received.		
E.1.2. Have appropriate media been used to invite comments by local stakeholders?	IRL 8	Yes see above.	☑	☑
E.1.3. If a stakeholder consultation process is required by regulations/laws in the host country, has the stakeholder consultation process been carried out in accordance with such regulations/laws?		No stakeholder consultation process is required by regulations/laws in the host country.	☑	☑
E.1.4. Is the undertaken stakeholder process that was carried out described in a complete and transparent manner?		Yes the PDD provide a complete a transparent description of the local stakeholder process.	☑	☑
E.2.Summary of the comments received				
E.2.1. Is a summary of the received stakeholder comments provided?		Yes.	☑	☑
E.3.Report on how due account was taken of any comments received				
E.3.1. Has due account been taken of any stakeholder comments received?		A questionnaire containing the 10 questions was handed out to the attendees. No additional comments were made on questionnaires.	☑	☑

CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PDD in GSP	Final PDD
F. Annexes 1 - 4				
F.1. Annex 1: Contact Information				
F.1.1. Is the information provided consistent with the one given under section A.3?		Yes it is.	☑	☑
F.1.2. Is the information on all private participants and directly involved Parties presented?		Yes it is.	☑	☑
F.2. Annex 2: Information regarding public funding				
F.2.1. Is the information provided on the inclusion of public funding (if any) in consistency with the actual situation presented by the project participants?		No public funds are used for the financing of the project activity.	☑	☑
F.2.2. If necessary: Is an affirmation available that any such funding from Annex-I-countries does not result in a diversion of ODA?		n.a.	☑	☑
F.3. Annex 3: Baseline information				
F.3.1. If additional background information on baseline data is provided: Is this information consistent with data presented by other sections of the PDD?		No additional background information on baseline data is provided.	☑	☑
F.3.2. If additional background information on baseline data is provided: Is this information consistent with data presented by other sections of the PDD?		No additional background information on baseline data is provided.	☑	☑
F.3.3. Is the data provided verifiable?		n.a.	☑	☑

CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PDD in GSP	Final PDD
Has sufficient evidence been provided to the validation team?				
F.3.4. Does the additional information substantiate / support statements given in other sections of the PDD?		n.a.	☑	☑
F.4. Annex 4: Monitoring information				
F.4.1. If additional background information on monitoring is provided: Is this information consistent with data presented in other sections of the PDD?		ISO 9001 and ISO 14001 certificates for Hu-Chems QA/QC systems have been attached (Annex 4). As monitoring system should be integrated in this QA/QC system.	☑	☑
F.4.2. Is the information provided verifiable? Has sufficient evidence been provided to the validation team?		ISO 9001 and ISO 14001 certificates were reviewed onsite (IRL 5a and IRL 5b).	☑	☑
F.4.3. Do the additional information and / or documented procedures substantiate / support statements given in other sections of the PDD?		n.a.	☑	☑

Table 2 Resolution of Corrective Action, Clarification and Forward Action Requests

Corrective Action Requests by audit team			
	Comments and Results	Ref	Conclusion and IRL
Issue	**Corrective Action Request No.1.** The estimation of emission reduction presented in PDD is not consistent with the actual situation found onsite as the start of operation of the new nitric acid plant is expected to be in September 2012 according to HuChems time schedule presented during onsite meeting. The PDD considers already emission reductions from July 2012. Please correct the PDD to be consistent with the actual planning.	A.2.3.	☑ This Finding is closed IRL 1b IRL 4l
Response	All relevant parts in the PDD (i.e. ex-ante estimation of emission reduction and dates of crediting period) were updated to reflect actual planning.		
Assessment	The validation team reviewed the revised PDD version 1.1 dated on 12/12/2011 submitted as response to the first loop of findings with special focus on starting date of crediting period and estimation of emission reductions. Hence the start of crediting period was found to be revised to comply with the actual planning The nitric acid plant is currently under construction and should become commercially operational not before September 2012 (date for mechanical completion is end of August 2012 as confirmed by EPC Contractor (IRL 4l)). Additionally the estimation of emission reductions has been modified and the estimation has been verified to be correct to correspond with the revised starting date of crediting period.		

Issue	**Corrective Action Request No.2.** During onsite visit the audit team visited the construction site for new nitric acid plant where the proposed CDM project is going to be implemented. During this visit PPs checked GPS coordinates. A slight deviation to the information presented in the PDD was found. Please correct the PDD and provide accurate GPS coordinates.	A.4.1.1.	☑ This Finding is closed IRL 1b IRL 2
Response	Exact co-ordinates of the plant site of the new nitric acid plant #5 are		

	Longitude: 127.74158 E Latitude: 34.84583 N Values have been updated in the revised PDD under section A.4.1.4.		
Assessment	The validation team reviewed the revised PDD version 1.1 dated on 12/12/2011 submitted as response to the first loop of findings with special focus on the GSP coordinates stated in Chapter A.4.1.4. The coordinates provide a correct and unique identification of the proposed project activity locations which could be evidenced with onsite visit IRL2.		

Issue	HuChems is among 470 companies which have been designated as mandatory participants in the Greenhouse Gas and Energy Target Scheme. The designation is based on the "Framework Act on Low Carbon, Green Growth", which came into effect on April 14, 2010 and "Guidelines on designation and management of companies for greenhouse gas reduction target management (Notification No 2010-109 of the Ministry of Environment on August 30, 2010)". The scheme was made to impose the target for greenhouse gas emission as well as energy use to controlled companies and check on manage their achievements. **Corrective Action Request No.3.** The PDD shall identify the baseline for the proposed CDM project activity, defined as the scenario that reasonably represents the anthropogenic emissions by sources of GHGs that would occur in the absence of the proposed CDM project activity. (VVM para 81). PPs defined the baseline scenario without any identification or consideration of relevant policies and circumstances which is required by decision 3/CMP.1, annex, paragraph 45.	B.4.1.	☑ This Finding is closed IRL 1b IRL 1c IRL 10a IRL 10b
Response	Hu-Chems has received one joint emission target under the GHG and Energy Target Scheme for its covered facilities not earlier than November 2011. The target has been issued as one total number of tCO_2e for all covered facilities and is valid for the year 2012. Among other GHG sources from the whole company, also N_2O emissions from the new nitric acid plant #5 are covered within this target based on the baseline situation (i.e. No N_2O abatement measure implemented). However, there is no whatsoever obligation to completely or partially destroy N_2O emissions from the production of nitric acid. Furthermore, there is no whatsoever directive, which GHG abatement/reduction measures are to be taken in order to achieve the joint emission target.		

	Consequently, no regulations requiring the abatement of N_2O emissions from the new nitric acid plant #5 are existing and Hu-Chems has no economic incentive to take any N_2O abatement measures, because this would entail capital and operating costs but no financial benefits. Therefore, the baseline scenario is that the N_2O is emitted to the atmosphere with no N_2O abatement measure being implemented.		
Assessment	The audit team reviewed the response from PP and the revised PDD version 1.1 (IRL 1b). Please provide any evidence (i.e. the notification from authority) to prove the statements provided that there is only "*one joint emission target under the GHG and Energy Target Scheme for its covered facilities not earlier than November 2011, The target has been issued as one total number of tCO_2e for all covered facilities and is valid for the year 2012*" The relevant information shall be translated in English. Furthermore the PDD shall be corrected to comply with VVM para 87. i.e.: All the assumptions and data used shall be listed in the PDD, including their references and sources Relevant national and/or sectoral policies and circumstances shall be listed and interpreted in the PDD.		
Response	The requested documentation (i.e. notification from the relevant authority KEMCO, related to the GHG and Energy Target) has been provided to the DOE. Relevant information has been translated into English, as requested and is clearly obvious to the DOE. The overall, joint GHG target for the whole company Hu-Chems is also clearly evident. Furthermore, a reference to the said notification has been placed in section B.1. of the revised PDD. Related, additional response is provided when addressing clarification request 4 below.		
Assessment	Together with the response and a revised version of PDD (IRL 1c) PPs submitted following documents which were reviewed by the audit team. 1. CAR#3_NotificationAuthority(KEMCO)_GHGTarget2012_trans (IRL 10a) 2. CAR#3&CL#3_N2ORegulationCheck(CleanAirConservationAct) (IRL 10b) IRL 10a shows one overall, joint GHG target for the whole company Hu-Chems of 416,113		

	tCO2e. Hence there is no specific target for the new nitric acid plant #5. There is only one target set which is for 2012. This complies with the local expertise of the audit team. IRL 10b is an extract of relevant regulations ("Clean Air Conservation Act") regarding air pollutants. Hence there is no regulation for N2O included. This complies with the local expertise of the audit team. The revised PDD (IRL 1c) Chapter B.4. include references to relevant local regulations and policies to define the baseline scenario (i.e. Clean Air Conservation Act and GHG and Energy Target Scheme based on the Framework act on Low Carbon, Green Growth).		

Issue	**Corrective Action Request No.4.** The source of data described in PDD for parameter $P_{NA,n}$ is not consistent with the applied methodology. Please describe the source of data to be used more accurately.	B.7.1.2	☑ This Finding is closed IRL 1b
Response	Applied methodology ACM0019 (Version 1) literally states "Measurements by project participants and production reports" as the source of data to be used. In fact, the production reports will be based on measurements by project participants. For the sake of clarity, wording in revised PDD has been changed from "Production reports" to "Production reports (based on measurements by project participants)"		
Assessment	The validation team reviewed the revised PDD version 1.1 dated on 12/12/2011 submitted as response to the first loop of findings with special focus on source of parameter $P_{NA,n}$. The source of $P_{NA,n}$ was found to be in compliance with the applied methodology.		

Issue	**Corrective Action Request No.5.** The current information regarding monitoring paratmeters should be updated. Please refer to PDD guide (EB41 Annex 12) for any guidance of information which need to be stated here as the section B.7.1 of PDD shall include specific information on how the data and parameters that need to be monitored would actually be collected during monitoring for the project activity. Where data or parameters are supposed to be measured, specify the measurement methods and procedures, including a specification which accepted industry standards or national or international standards will be applied, which measurement equipment is used, how the measurement is undertaken, which calibration procedures are applied,	B.7.1.3	☑ This Finding is closed IRL 1b

	what is the accuracy of the measurement method, who is the responsible person/entity that should undertake the measurements and what is the measurement interval.		
Response	Respective section in PDD has been updated and additional, currently available information (i.e. as currently available in this stage of project development) has been provided. Information stated is in accordance with the applied methodology.		
Assessment	The validation team reviewed the revised PDD version 1.1 dated on 12/12/2011 submitted as response to the first loop of findings with special focus on the description of monitoring parameters. The description of monitoring parameters was found to be complete considering the actual project status (i.e. no specific manufacturer/product has been selected for any instrument).		

Issue	The assumed crediting time is assumed to be 10 years. This is found to be reasonable for such kind of project activity. **Corrective Action Request No.6.** Please correct the information under section C.2.2.1. "Expected starting date of first crediting period: 01/07/2012" as this is a fixed crediting period.	C.2.1.	☑ This Finding is closed IRL 1b
Response	Wording has been changed in revised PDD: “first” has been removed.		
Assessment	The validation team reviewed the revised PDD version 1.1 dated on 12/12/2011 submitted as response to the first loop of findings with special focus on the information provided in Chapter C.2.2.1. Hence the information was found to correct “		

Clarification Requests by audit team			
	Comments and Results	Ref	Conclusion and IRL
Issue	**Clarification Request No. 1.** The project activity must comply with the requirements of paragraph 37 of the CDM modali-	A.3.2.	☑ This Finding

Clarification Requests by audit team			
	ties and procedures. Hence please provide Letter of Approvals from all parties involved in this project activity and a MoC.		is closed IRL 11a IRL 11b
Response	-		
Assessment	PPs provided LoA (IRL 11a) and MoC (IRL 11b):		

Issue	**Clarification Request No. 2.** Please provide any evidence that the measurement of total gas volume flow can be carried out in the tail gas stream after the abatement of N2O emissions throughout the crediting period of the project activity.	B.2.2.	☑ This Finding is closed IRL 4h
Response	UHDE, the technology supplier of the tertiary N2O abatement facility, has issued a statement, confirming that continuous real-time measurements of the N2O concentration and the total gas volume flow can be carried out in the tail gas stream after the abatement of N2O emissions. The statement was provided to the DOE for validation.		
Assessment	The validation team reviewed the statement provided by Uhde which confirms that the measurement of total gas volume flow can be carried out in the tail gas stream after the abatement of N2O emissions at HuChems 5 plant.		

Issue	HuChems is among 470 companies which have been designated as mandatory participants in the Greenhouse Gas and Energy Target Scheme. The designation is based on the "Framework Act on Low Carbon, Green Growth", which came into effect on April 14, 2010 and "Guidelines on designation and management of companies for greenhouse gas reduction target management (Notification No 2010-109 of the Ministry of Environment on August 30, 2010)". The scheme was made to impose the target for greenhouse gas emission as well as energy use to controlled companies and check on manage their achievements. **Clarification Request No. 3.** The project activity will be implemented at the HuChems 5 nitric acid plant which is expected to start operation in September 2012. PPs are requested to clearly clarify the legal situation	B.2.3.	☑ This Finding is closed IRL 10a IRL 10b

	in regard of any mandatory complete or partial N2O destruction for nitric acid production at HuChems plant 5 in respect of the legal situation of the host country. In doing so clear evidence shall be provided that there is no law or regulation which mandates the complete or partial destruction of N2O from nitric acid plants existing in the South Korea as required by the applicability conditions of the applied methodology.		
Response	The legal framework in the Republic of Korea does not mandate the complete or partial destruction of N2O from nitric acid plants existing in South Korea. Relevant law clearly document, that no limits for the emission of N2O are in place for nitric acid plants or any other such source within the Republic of Korea. Similarly, the "Framework Act on Low Carbon, Green Growth" does not mandate the complete or partial destruction of N2O from nitric acid plants in the Republic of Korea.		
Assessment	The audit team reviewed the response from PP and the revised PDD version 1.1. Please provide any evidence (i.e. the "Relevant law clearly document that no limits for the emission of N2O are in place for nitric acid plants or any other such source within the Republic of Korea" is existing) The relevant information shall be translated in English. Furthermore the PDD shall be corrected to comply with VVM para 71. i.e.: All the assumptions and data used shall be listed in the PDD, including their references and sources Relevant national and/or sectoral policies and circumstances shall be listed and interpreted in the PDD.		
Response	Requested evidence documents on the legal situation in Korea have been provided to the DOE and respective section B.2. in PDD has been updated with regard to relevant legislation.		
Assessment	The audit team reviewed the response from PPs and following documents received from PPs: 1. CAR#3&CL#3_N2ORegulationCheck(CleanAirConservationAct) (IRL 10b) 2. CAR#3_NotificationAuthority(KEMCO)_GHGTarget2012_trans (IRL 10a) IRL 10b is an extract of relevant regulations ("Clean Air Conservation Act") regarding air		

	pollutants. Hence there is no regulation for N2O included. This complies with the local expertise of the audit team. IRL 10a shows one overall, joint GHG target for the whole company Hu-Chems of 416,113 tCO2e. Hence there is no specific target for the new nitric acid plant #5. There is only one target set which is for 2012. This complies with the local expertise of the audit team. The revised PDD (IRL 1c) Chapter B.2. include references to relevant local regulations and policies to justify the applicability of ACM0019 (i.e. Clean Air Conservation Act and GHG and Energy Target Scheme based on the Framework act on Low Carbon, Green Growth).		

Issue	**Clarification Request No. 4.** PPs shall clarify why the operator of the new nitric acid plant which is expected to start operation in September 2012 has no economic incentive to take any N2O abatement measures. In doing so relevant policies and circumstances shall be considered.	B.4.1	☑ This Finding is closed IRL 1c IRL 4l IRL 6e IRL10c-i
Response	Hu-Chems has received one joint emission target under the GHG and Energy Target Scheme for its covered facilities not earlier than November 2011. The target has been issued as one total number of tCO2e for all covered facilities and is valid for the year 2012. Among other GHG sources from the whole company, also N2O emissions from the new nitric acid plant #5 are covered within this target. However, there is no whatsoever obligation to completely or partially destroy N2O emissions from the production of nitric acid. Furthermore, there is no whatsoever directive, which GHG abatement/reduction measures are to be taken in order to achieve the joint emission target. Based on documented information, Hu-Chems will be able to fulfil its obligation under the GHG and Energy Target Scheme without taking any N2O abatement measure in its new nitric acid plant #5. Consequently, no regulations requiring the abatement of N2O emissions from the new nitric acid plant #5 are existing and Hu-Chems has no economic incentive to take any N2O abatement measures, because this would entail capital and operating costs but no financial benefits. Therefore, the baseline scenario is that the N2O is emitted to the atmosphere with no N2O abatement measure being implemented.		

Assessment	The validation team needs further clarification and evidence that the operator has no economic incentive to take any N2O abatement measures, considering the current policies and circumstances as HuChems has received one joint emission target under the GHG and Energy Target Scheme for the year 2012 as clarified by PPs. Furthermore PPs shall provide any interpretation of current policies and circumstances as required by VVM para 87 in the PDD that the operator of the new nitric acid plant has no economic incentive to take any N2O abatement measures. (e.g. any possibility of trading / selling of emission reductions, incentive to achieve the HuCHems target with any N2O abatement measures at the new nitric acid plant. The relevant information shall be translated in English. Furthermore the PDD shall comply with VVM para 87. i.e.: All the assumptions and data used shall be listed in the PDD, including their references and sources Relevant national and/or sectoral policies and circumstances shall be listed and interpreted in the PDD.		
Response	It was the initial understanding by the project participant, that in case of the absence of any laws/regulations which would mandate the complete or partial destruction of N2O from nitric acid plants in the Republic of Korea, the project activity is considered additional and the baseline scenario would be the emission of N2O to the atmosphere with no N2O abatement measure being implemented. However, as described in the initial response to this clarification request, Hu-Chems has received one joint, overall GHG emission target for all its eligible facilities. Hu-Chems will be able to fulfil its joint GHG target without the introduction of any N2O abatement measure in its plant Hu-Chems #5, as the expected overall emissions from all eligible facilities in Hu-Chems (320,269 tCO2e) are below the joint GHG target (416,113 tCO2e). Besides, no economic benefits are achieved when undershooting the joint GHG target, which would substantiate the introduction of N2O abatement measures,		

	Furthermore, related clarification has been added in section B.1. of the revised PDD. Related, additional response is provided when addressing corrective action request 3 above.		
Assessment	This response, a revised version of PDD (IRL 1c) following documents provided documents were reviewed by the audit team.: 1. CL#4_Comparison_Target&Emissions (IRL 10c) 2. CL#4_DocumentationGrowthRate (IRL 10d) 3. CL#4_EmissionsNewPlants(BLSetting) (IRL 10e) 4. CL#4_ERModel_ACM0019_incACTUALEmisisons (IRL 10f) 5. CL#4_HistoricalEmissionsEligibleFacilities(BLSetting) (IRL 10h) 6. CL#4_ProcessFlowDiagram_(N2OConcentration) (IRL 6b) 7. CL#4_EmissionsNewPlants (IRL 10k) 8. Letter from Hanhwa (the EPC contractor for HuChems Nitric Acid plant #5) (IRL 4l) 9. HUC#5_GHGSensitivityAnalysis (IRL 6e) As assessed under CAR 3 there was set one joint GHG target for the whole company Hu-Chems of 416,113 tCO2e under the GHG and Energy Target Scheme. PPs expect emission of HuChems below this target as they expect GHG emissions of 320,269 tCO2e (IRL 10c).This figure is derived from three emission sources: a) Emissions from existing facilities (operational in 2007 – 2009): 30,803 tCO2e Calculation as per GHG Target Scheme regulations: Average on historical emissions in 2007 to 2009 from target eligible facilities as provided to the authority for GHG Target setting (IRL 10h) times a growth rate (IRL 10d). b) Emissions from new facilities (except N2O from Hu-Chems #5 NA): 11,346 tCO2e Expected emissions from new facilities (all but N2O from Hu-Chems #5) in 2012, as confirmed by the authority for GHG Target setting (IRL 10e) c) N2O from Hu-Chems #5: 278,120 tCO2e		

	Calculation based on plant design documents (Process Flow Diagram) (IRL 10i) and expected days of operation in 2012 (IRL 4l). A sensitivity analysis (IRL6e) varying the expected start of operation of HuChems #5 plant by +/- 1 month substantiate the overall result that the expected emission in 2012 are below the target. In summary Hu-Chems target for 2012 is higher than the expected emission in 2012 and the existing system does not foresee any trading of emission reduction (IRL 10i), therefore the operator of the new nitric acid plant has currently no economic incentive to take any N2O abatement measures.		

Issue	**Clarification Request No. 5.** PPs assume that the amount of N2O released through the by-pass to a tertiary N2O abatement system to the atmosphere (QN2O,by-pass,n) is zero. Please provide a clear justification for this assumption in the PDD.	B.7.1.5	☑ This Finding is closed IRL 4i
Response	In the course of the implementation of tertiary abatement system, no by-pass will be implemented. Hence, the gas stream from the nitric acid plant will in any case be sent to the tertiary N2O abatement facility and cannot be vented to the atmosphere through a by-pass. The principal system will be designed according to the EnviNOx® system installed in plant #4 (which is operated under the registered CDM Project Activity 0765) and no by-pass is installed in this facility either, as obvious from engineering documents and physical implementation. The revised PDD has been updated respectively. Furthermore, UHDE, the technology supplier of the tertiary N2O abatement facility, has issued a statement, confirming, that no by-pass will be implemented. The statement was provided to the DOE for validation.		
Assessment	The validation team reviewed the statement from Uhde (IRL 4i) and revised PDD with special focus on B.6.1. “Explanation of methodological choices” where PPs are describing the project specific situation regarding $Q_{N2O,by\text{-}pass,n}$. Hence following situation applies, in case an EnviNOx® reactor will be implemented in the new nitric acid plant 5 of Huchems according to (IRL 4i):		

	The nitric acid plant of Huchems 5 has no bypass for the EnviNOx® reactor. The nitric acid plant can only operate if the tail gas is passing the EnviNOx® reactor. Even during shut down the tail gas will pass through the EnviNOx® reactor. Revised PDD considers a default value for $Q_{N2O,by\text{-}pass,n}$ of zero. This choice is found to be reasonable and it is justified with the statement from Uhde (IRL 4i).		

Issue	**Clarification Request No. 6.** EB61 Annex 12 requires to describe the operational and management structure that the project operator will implement in order to monitor emission reductions generated by the project activity. The PDD shall clearly indicate the responsibilities for and institutional arrangements for data collection and archiving.	B.7.2.1	☑ This Finding is closed IRL 1b
Response	Existing provisions of the PDD have been extended in the revised PDD, as per CL6 (i.e. especially regarding responsibilities and institutional arrangements for data collection and archiving)		
Assessment	The validation team reviewed the revised PDD with special focus on the responsibilities for and institutional arrangements for data collection and archiving. Hence responsible entity for data collection and archiving has been found in Chapter B.7.2.		

Issue	The project starting date is stated as “Expected to be in early 2012”. This is the date, when the contract with the supplier on the delivery of the N2O abatement facility becomes effective. **Clarification Request No. 7.** The audit team could not find any clear evidence for this date. To confirm this date it is required to provide clear evidence or at least a statement from the proposed N2O catalyst supplier that HuChems has not ordered any catalyst for the proposed CDM activity yet.	C.1.1.	☑ This Finding is closed IRL4j
Response	As outlined in the PDD, the starting date will be the day, when the contract with the supplier on the delivery of the N2O abatement facility becomes effective. More specifically, this means the “Supplementary Agreement for option of EnviNOx® Up-		

	grade system" with UHDE, the technology supplier of the tertiary N2O abatement facility. In order to address CL7, UHDE, has issued a statement, that the "Supplementary Agreement for option of EnviNOx® Upgrade system" is not yet effective (11/11/2011). Therefore, no commitment for expenditures related to the implementation or construction of the project activity have been made so far. The statement as well as the agreement was provided to the DOE for validation. Starting date has been changed in the PDD, based on actual situation		
Assessment	The validation team reviewed the revised PDD and the statement from Uhde (IRL4j). Hence the project starting date is plausible.		

Issue	**Clarification Request No. 8.** Please provide any prove that the expected project lifetime is 25 years as stated in the PDD.	C.1.1.	☑ This Finding is closed IRL 4k
Response	UHDE, the technology supplier of the tertiary N2O abatement facility, has issued a statement, substantiating the expected project lifetime of 25 years. The statement was provided to the DOE for validation.		
Assessment	The validation team reviewed the statement from Uhde (IRL4k). Hence technology supplier confirms a technical design lifetime for the nitric acid plant and EnviNOx® system. Only the EnviNOx® catalyst material has has to be replaced in this period.		

Forward Action Requests by audit team			
	Comments and Results	Ref	Conclusion and IRL
Issue	**Forward Action Request No. 1** In accordance with paragraph 62(g) of the CDM Modalities and Procedure, the DOE contracted by the project participant to perform verification shall, "Identify and inform the project participants of any concerns related to the conformity of the actual project activity and its operation with the registered project design document. Project participants shall		

Forward Action Requests by audit team			
	address the concerns and supply relevant additional information;" HuChems is mandatory participant of the Greenhouse Gas and Energy Target Scheme and thus, the new nitric acid plant is one GHG emission source which has also been reported to the authority for target setting. The validation opinion is based on the current laws and regulations which are described in Validation Report. Any change of the Greenhouse Gas and Energy Target Scheme or other legislation which affects the project activity's emission reduction under CDM should be assessed by the verifying DOE.		
Response	*required for verification*		
Assessment	*to be assessed by the verifying entity*		

Table 3 Unresolved Corrective Action and Clarification Requests (in case of denials)

Clarifications and / or corrective action requests by validation team	**Id. of CAR/CR**	**Explanation of Conclusion for Denial**
-	-	-

Annex 2

Information Reference List

Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date	Additional Information (Relevance in CDM context)
1	Carbon CDM Korea Ltd. Hu-Chems Fine Chemical Corp.	**Project Design Document** a. PDD of proposed CDM project "Reduction of N2O emissions from the new nitric acid plant #5 of Hu-Chems Fine Chemical Corp." version 1.0, dated on 27/09/2011 submitted for GSP b. PDD of proposed CDM project "Reduction of N2O emissions from the new nitric acid plant #5 of Hu-Chems Fine Chemical Corp." version 1.1, dated on 12/12/2011 submitted together with response to 1st Loop of Findings c. PDD of proposed CDM project "Reduction of N2O emissions from the new nitric acid plant #5 of Hu-Chems Fine Chemical Corp." version 1.2, dated on 21/12/2011 submitted together with response to 2nd Loop of Findings d. PDD of proposed CDM project "Reduction of N2O emissions from the new nitric acid plant #5 of Hu-Chems Fine Chemical Corp." version 1.3, dated on 19/04/2012 submitted together with LoA and MoC e. PDD of proposed CDM project "Reduction of N2O emissions from the new nitric acid plant #5 of Hu-Chems Fine Chemical Corp." version 1.4, dated on 22/06/2012 - Final Version	Various See the left column.	PDD
2	UNFCCC IPCC	**References and requirements at UNFCCC** a. UNFCCC homepage http://www.unfccc.int including the CDM section http://cdm.unfccc.int/index.html. b. Approved consolidated baseline and monitoring methodology ACM0019 - N2O abatement from nitric acid production, version 01.0.0 c. Guidelines for completing the project design document (CDM-PDD) and the proposed new baseline and monitoring methodologies (cdm-nm), version 01 (Annex 41, EB12) d. 2006 IPCC Guidelines for National Greenhouse Gas Inventories	Various See the left column.	UNFCCC Regulative

Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date	Additional Information (Relevance in CDM context)
		e. Tool to determine the mass flow of a greenhouse gas in a gaseous stream, version 02 (Annex 11, EB61) http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-08-v1.pdf/history_view f. CDM Glossary version 05 (EB47) http://cdm.unfccc.int/Reference/glossary.html g. CDM Validation and Verification Manual, version 01.2 (EB55)		
3	TÜV SÜD	**Audit participants** On-site and on-line interviews conducted on 06-10-2011 by TÜV SÜD Hu-Chems Fine Chemical Corp. Verification team: Martin Hammer — GHG Validator — TÜV SÜD Jungho Yoon — GHG Validator — TÜV SÜD Korea Interviewed persons: Mr. Byung-Chul Lim — Team manager / Engineering team — Hu-Chems. Mr. Jong-Hyuk Ra — Team manager / Project 1 team — Hu-Chems Mr. Sung-Hyun Kyung — Ass. manager / Engineering team — Hu-Chems Mr. Ki-Tai Kim — Project directory — Hu-Chems Mr. Soon-Gi Kim — Engineer / Project 1 team — Hu-Chems Mr. Dong-Hyun Kim — Project manager — Carbon CDM Korea Ltd	See the left column.	Onsite audit

Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date	Additional Information (Relevance in CDM context)
		Mr. AndreasRammelmüller Project manager Carbon Climate Protection GmbH		
4	Hu-Chems Fine Chemical Corp.	**Project planning** a. Hu-Chems's internal approval for investing Nitric Acid plant on 18/08/2010 b. License agreement between Hu-Chems & Uhde GmbH for the basic engineering of Nitric Acid plant effective on 20/10/2010 c. Critical Equipment Sales Agreement between HuChems Fine Chemical Cooperation and Uhde GmbH for Nitric Acid Plant effective on 20/10/2010 d. Supplementary agreement for option of EnviNOx (DeN2O) system with Uhde GmbH on October, 2010 e. Approval for Land usage from Korea Industrial Complex Corporation on 05/10/2011 (reason: Plant construction of Nitric Acid #5 plant) f. Construction approval for Nitric Acid #5 plant from Yeosu City on 08/09/2011 g. Agreement between Hu-Chems and Carbon CDM Korea Ltd. on 22/08/2011 h. Statement from ThyssenKrupp Uhde dated and signed on 11/11/2011 regarding continuous measurement possibility in the tail gas of HuChems 5 plant i. Email from Bernhard Hündgen - Senior Process Engineer Hydrogen & Nitrates Division (HN) ThyssenKrupp Uhde GmbH, Germany – dated on 21/10/2011 with subject "Huchems_5_EnviNOx®_implementation" regarding bypass of tertiary abatement facility at of HuChems 5 plant j. Statement from ThyssenKrupp Uhde dated and signed on 11/11/2011 regarding	Various See the left column.	

Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date	Additional Information (Relevance in CDM context)
		effectiveness of "Supplementary Agreement for option of EnviNOx® Upgrade system at HuChems 5 plant k. Statement from ThyssenKrupp Uhde dated and signed on 11/11/2011 regarding project lifetime l. Letter from Hanhwa (the EPC contractor for HuChems Nitric Acid plant #5) Subject: with regard to request for reconfirmation on the extension of project period(Mechanical Completion) for additional 1 month in 5NA project dated on 19/01/2012; filename "EPC_contractor_letter_to_Huchems1" m. Statement from ThyssenKrupp Uhde dated and signed on 11/11/2011 regarding parameter to identify the operating hours of HuChems 5 plant		
5	Korea Gas Safey Cooperation	**Procedures and standards** a. KS Q ISO 9001:2009 / ISO 9001:2008 certificate dated on 17/08/2011 issued by Korea Gas Safey Cooperation valid until 06/11/2014 b. KS I ISO 14001:2009 / ISO 14001:2004 certificate dated on 17/08/2011 issued by Korea Gas Safey Cooperation valid until 06/11/2014	Various See the left column.	
6	Hu-Chems Fine Chemical Corp., Uhde GmbH, Carbon CDM Korea Ltd. Carbon	**Technical documents, Nitric Acid Plant** a. License agreement between Hu-Chems & Uhde GmbH for the basic engineering of Nitric Acid plant effective on 20/10/2010 including Technical specification of Nitric Acid plant #5 Capacity: 1,150 MT/d for production of Nitric acid b. Process Flow Diagram issued by UHDE in 2010 for HU-CHEMS 5 Seoul, Korea Nitric Acid Plant - Temperature: 890°C (AOR: Ammonia Oxidation Reactor) checked with "Process Flow	Various See the left column.	

Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date	Additional Information (Relevance in CDM context)
	Climate Protection GmbH	diagram" - Pressure: 4.5 bar (AOR: Ammonia Oxidation Reactor) checked with "Process Flow diagram" c. Ex-ante estimation of water content in tail gas "20110921_HUC#5_WaterContent.xls" d. Performance specification of EnviNOx (DeN2O) system which is from Nitric Acid plant #4 issued by UHDE GmbH revision 00, dated on December 2004 (page 14) Annex A1 e. HUC#5_GHGSensitivityAnalysis included an sensitivity analysis of expected GHG emissions in 2012 of HuChems Nitric Acid plant 5.		
7	Various See the right column.	**Environmental issue** a. Official reply from the Ministry of Environment of Korea for the necessity of Environmental Impact Assessment for this proposed project activity on 17/08/2011 b. Integrated Pollution Prevention and Control Reference Document on Best Available Techniques for the Manufacture of Large Volume Inorganic Chemicals - Ammonia, Acids and Fertilisers dated on August 2007	Various See the left column.	Environmental issue
8	Carbon CDM Korea Ltd. Hu-Chems Fine Chemical Corp., Seoul Ilbo, wbn24.com,	**Local Stakeholder Meeting** a. Local Stakeholder Invitation Card for Local Stakeholders dated on September 27th 2011 b. Presentation Reduction of N2O emissions from the new nitric acid plant #5 of Hu-Chems Fine Chemical Corp. for Meeting of Local Stakeholders dated on September 27th 2011 issued by Carbon CDM Korea Ltd. c. Invitation List d. Signed List of Participants for Local Stakeholder Meeting dated on 27/09/2011 e. Questionnaire for Local Stakeholders dated on 27/09/2011	Various See the left column.	Local Stakeholder Meeting

Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date	Additional Information (Relevance in CDM context)
	dbltv.com, BreakNews, Naver, KyungHang.com	f. Announcements and Reports from newspapers and online news regarding for Local Stakeholder Meeting dated on 27/09/2011		
9	Carbon CDM Korea Ltd.	**ER Estimation Calculation spreadsheet** a. Emission reduction calculation tool "20111006_HUC#5_ERModel_ACM0019" contained "Input data & N2O outlet concentration calculation" submitted during on-site audit on 06/11/2011 b. Final emission reduction calculation tool "CL#4_ERModel_ACM0019_incACTUALEmisisons" submitted on 21/12/2011 c. Final emission reduction calculation tool "HUC#5_ERModel_ACM0019" submitted on 20/01/2012	Various See the left column.	
10	KEMCO Carbon CDM Korea Ltd. Hu-Chems Fine Chemical Corp., others	**Relevant documentation regarding law or regulations** a. Email from KEMCO Subject: Answering for the claim of GHG Target value for 2012 dated on 24/11/2011 filename "CAR#3_NotificationAuthority(KEMCO)_GHGTarget2012_trans" including attachments "Official Letter from MKE" and the "HuCHems´target value". b. Extract from Korean Clean AirConservation Act filename "CAR#3&CL#3_N2ORegulationCheck(CleanAirConservationAct)" c. "Comparision between determined specific target on GHG emissions and expected actual emission levels" filename "CL#4_Comparison_Target&Emissions" issued by Carbon CDM Korea Ltd. on 21/12/2011	Various See the left column.	Legislation

Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date	Additional Information (Relevance in CDM context)
		d. Documentation of Growth Rate filename CL#4_DocumentationGrowthRate submitted by Carbon CDM Korea Ltd. on 21/12/2011 e. Email communication between HuChems and KEMCO Subject: Request for confirmation of the GHG emission from new plants in 2012(HUCHEMS) from 11-12/01/2012 f. Homepage of Ministry of Environment, News Title "470 companies designated to be controlled by the GHG and Energy Target Scheme" published on 2010.09.29 http://eng.me.go.kr/board.do?method=view&docSeq=8791&bbsCode=new_news&currentPage=3&searchType=&searchText=&categoryCode=04 g. Data Sheets with HuChems GHG emissions for the the years 2007-2009 filename "CL#4_HistoricalEmissionsEligibleFacilities(BLSetting) submitted by Carbon CDM Korea Ltd. on 12/12/2011 h. Emissions from new facilities of HuChems filename "CL#4_EmissionsNewPlants" issued by Carbon CDM Korea Ltd. on 02/01/2012 i. Framework act on Low Carbon, Green Growth		
11	Various See the right column.	**LoA and MoC** a. Letter of Approval issued by the Ministry of Knowlwdge Economy from the Republic of Korea dated on 05/04/2012 b. Modalities of communications issued by Carbon CDM Korea Ltd. and Hu-Chems Fine Chemical Corp.dated signed on 02/05/2012 c. Communication with person in charge of Korean DNA (03/05/2012) who is Mr. Hong, Ki-Hyup who confirmed that the LoA is authentic and real	Various See the left column.	

Annex 3

Appointment Certificates

ZERTIFIKAT ◆ CERTIFICATE ◆ 認証証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

CERTIFICATE OF APPOINTMENT

TÜV SÜD Industrie Service

Ms Peretykina, Anna, fulfills the requirements of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH to participate in audits.

Qualification applicable to						
Standard	CDM	JI	GS	VCS	VER	Other
Date	04.04.11					

Qualification as						
Status	Trainee	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date		04.04.11	04.04.11	22.07.11		

Other qualification					
Country Expertise					
Region	1	2	3	4	5
Date	04.04.11				
Financial Expertise					
Date	04.04.11				

Qualification in technical areas	
Technical Area	**Date**

This appointment is valid for 1 year from its date of signature below and is bound by internal requirements of the Management System of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH.
In case of loss of validity of this certificate as per result of an assessment according internal procedures or due to any other reason, it will be properly communicated to you.
Your Certificate has the internal reference No. CMS-Z-0012/04.

Date	Signature
04.04.12 Extension of Validity	

TÜV®

ZERTIFIKAT ◆ CERTIFICATE ◆ 認証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

CERTIFICATE OF APPOINTMENT

TÜV SÜD Industrie Service

Mr Hammer, Martin, fulfills the requirements of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH to participate in audits.

Qualification applicable to						
Standard	CDM	JI	GS	VCS	VER	Other
Date	23.03.11					

Qualification as						
Status	Trainee	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date		23.03.11	23.03.11	23.03.11		

Other qualification					
Country Expertise					
Region	1	2	3	4	5
Date	23.03.11				
Financial Expertise					
Date	23.03.11				

Qualification in technical areas	
Technical Area	**Date**
1.2_Energy generation from renewable energy source	23.03.11
5.1_4.9_11.1_12.1_Chemical process industries	23.03.11

This appointment is valid for 1 year from its date of signature below and is bound by internal requirements of the Management System of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH.
In case of loss of validity of this certificate as per result of an assessment according internal procedures or due to any other reason, it will be properly communicated to you.
Your Certificate has the internal reference No. CMS-Z-0005/02.

Date	Signature
23.03.12 Extension of Validity	

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ZERTIFIKAT ◆ CERTIFICATE ◆ 認証証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

CERTIFICATE OF APPOINTMENT

TÜV SÜD Industrie Service

Mr Jung-Ho, Yoon, fulfills the requirements of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH to participate in audits.

Qualification applicable to						
Standard	CDM	JI	GS	VCS	VER	Other
Date	27.04.11					

Qualification as						
Status	Trainee	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date		27.04.11	27.04.11			

Other qualification					
Country Expertise					
Region	1	2	3	4	5
Date	27.04.11				
Financial Expertise					
Date					

Qualification in technical areas	
Technical Area	**Date**
13.1_Waste handling and disposal	27.04.11

This appointment is valid for 1 year from its date of signature below and is bound by internal requirements of the Management System of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH.
In case of loss of validity of this certificate as per result of an assessment according internal procedures or due to any other reason, it will be properly communicated to you.
Your Certificate has the internal reference No. CMS-Z-0048/02.

Date	Signature
27.04.12 Extension of validity	Thomas Klein

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ZERTIFIKAT ◆ CERTIFICATE ◆ 認証証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

CERTIFICATE OF APPOINTMENT

Industrie Service

Mr Tausche, Konrad, fulfills the requirements of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH to participate in audits.

Qualification applicable to						
Standard	CDM	JI	GS	VCS	VER	Other
Date	30.03.11					

Qualification as						
Status	Trainee	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date		30.03.11	30.03.11	30.03.11	30.03.11	

Other qualification					
Country Expertise					
Region	1	2	3	4	5
Date	30.03.11				
Financial Expertise					
Date	30.03.11				

Qualification in technical areas	
Technical Area	**Date**
1.1_4.10_Thermal energy generation...	30.03.11
5.1_4.9_11.1_12.1_Chemical process industries	30.03.11
13.1_Waste handling and disposal	30.03.11

This appointment is valid for 1 year from its date of signature below and is bound by internal requirements of the Management System of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH.
In case of loss of validity of this certificate as per result of an assessment according internal procedures or due to any other reason, it will be properly communicated to you.
Your Certificate has the internal reference No. CMS-Z-0035/02.

Date	Signature
30.03.12 Extension of Validity	Thomas Klein

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