VERIFICATION REPORT

HYOSUNG EBARA ENGINEERING CO., LTD.

VERIFICATION OF THE N2O ABATEMENT PROJECT OF CAPRO CORPORATION

REPORT NO.BVC/CHINA-VR/8711/2012

REVISION NO.01

BUREAU VERITAS CERTIFICATION

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VERIFICATION REPORT

Date of first issue:	Organizational unit:
11/12/2012	Bureau Veritas Certification Holding SAS
Client:	Client ref.:
Hyosung Ebara Engineering Co., Ltd.	Mr. Park, Jong-hoon

Summary:

Bureau Veritas Certification has conducted the 2nd periodic verification of N2O Abatement Project of Capro Corporation, CDM Registration Reference Number 4665, owned by Capro Corporation; Hyosung Ebara Engineering Co., Ltd.; and Hyosung Corporation, which is located in Bugok-dong, Nam-gu, Ulsan, the south-eastern part of the Republic of Korea, and applying the methodology AM0028 Version 05, on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM rules and modalities and the subsequent decisions by the CDM Executive Board, as well as the host country criteria.

The verification scope is defined as an independent and objective review and ex-post determination of the monitored GHG emission reductions, and consisted of the following three phases: i) desk review of the project design, the baseline and monitoring plan; ii) follow-up interviews with project stakeholders; iii) resolution of outstanding issues and the issuance of the final verification report and opinion. The overall verification, from Contract Review to Verification Report & Opinion, was conducted using Bureau Veritas Certification internal procedures.

In summary, Bureau Veritas Certification confirms that the project is implemented as planned and described in the validated and registered project design document. Installed equipments being essential for generating emission reduction run reliably and are calibrated appropriately. The monitoring system is in place and the project is generating GHG emission reductions. The GHG emission reductions are calculated without material misstatements, and the emission reductions verified totalize 216,537 tons of CO_2e for the monitoring period.

Our opinion relates to the projects' GHG emissions and resulting GHG emission reductions reported and related to the valid and registered project baseline, monitoring plan and its associated documents.

Reporting period:	01/09/2011 to 31/12/2011	
Baseline emissions:	242,899.40	t CO_2 equivalents.
Project emissions:	26,361.62	t CO_2 equivalents.
Leakage emissions:	0	t CO_2 equivalents.
Emission Reductions:	216,537	t CO_2 equivalents.

Report No.:	Subject Group:
BVC-China/VR8711/2012	CDM
Project title:	
N2O Abatement Project of Capro Corporation	
Work carried out by:	
Mr. (Ernesto) Tan Wenbin - Team Leader Mr. (Jony) Li Qing - Specialist	
Internal Technical Review carried out by:	
Ms. (Coco) Geng Yan Ms. An Baifang - Specialist	

Date of this revision:	Rev. No.:	Number of pages:
18/12/2012	01	50

Indexing terms

Work approved by:	
Flavio Gomes	

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Abbreviations

AMS	Automated Measuring System
AOR	ammonia oxidation reactor
AST	Annual Surveillance Test
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reductions
CL	Clarification Request
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
DAS	Data Acquisition System
DCS	Distributed Control System
DCU	Data Communication Units
DOE	Designated Operational Entity
EEU	Electronic Evaluation Unit
FAR	Forward Action Request
GHG	Green House Gas(es)
HDD	Hard Disk Drive
HNO_3	Nitric Acid
LNG	Liquefied Natural Gas
MoV	Means of Verification
MP	Monitoring Plan
MR	Monitoring Report
NAS	N_2O Abatement System, also called destruction facility and De-N_2O Facility
N_2O	Nitrous Oxide
PDD	Project Design Document
PP	Project Participant
QAL	Quality Assurance Levels
RTO	Regenerative Thermal Oxidizer
UNFCCC	United Nations Framework Convention on Climate Change
VVS	Validation and Verification Standard

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1. INTRODUCTION

Hyosung Ebara Engineering Co., Ltd. has commissioned Bureau Veritas Certification to verify the emissions reductions of its CDM project N2O Abatement Project of Capro Corporation (hereafter called "**the Project**") in Bugok-dong, Nam-gu, Ulsan, the south-eastern part of the Republic of Korea.

This report summarizes the findings of the verification of the Project, performed on the basis of UNFCCC criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

1.1. Objective

The objective of CDM verification is to conduct a thorough, independent assessment of the registered project activities.

In carrying out its verification work, the DOE shall ensure that the project activity complies with the requirements of paragraph 62 of the CDM modalities and procedures. In particular, this assessment shall:

(a) Ensure that the project activity has been implemented and operated as per the registered PDD or any approved revised PDD, and that all physical features (technology, project equipment, and monitoring and metering equipment) of the project are in place;

(b) Ensure that the monitoring report and other supporting documents provided are complete in accordance with latest applicable version of the completeness checklist for requests for issuance of CERs, verifiable, and in accordance with applicable CDM requirements;

(c) Ensure that actual monitoring systems and procedures comply with the monitoring systems and procedures described in the monitoring plan or any revised approved monitoring plan, and the approved methodology including applicable tool(s);

(d) Evaluate the data recorded and stored as per the monitoring methodology including applicable tool(s).

1.2. Scope

The verification scope is defined as an independent and objective review and ex-post determination of the monitored GHG emission reductions. The verification is based on the validated and registered project design document, the monitoring report, emission reduction calculation spreadsheet, and supporting documents. The information in these documents is reviewed against Kyoto Protocol requirements, UNFCCC rules and associated interpretations.

The verification is not meant to provide any consulting service towards the PPs. However, stated requests for clarifications and/or corrective actions may provide input for improvement of the project monitoring towards reductions in the GHG emissions.

1.3. GHG Project Description

Caprolactam is produced by cyclohexane, ammonia, and sulphur as its primary raw materials. The existing caprolactam plants for this proposed project activity employ Raschig process other than HPO process, which converts Ammonium Carbonate to Ammonium Nitrite through the reacting with Nitrogen Oxide, and Ammonium Nitrite converted to Hydroxylamine Disulfonate and thence to Hydroxylamine Sulfate. Within the Caprolactam production process, ammonia is oxidized in the four AORs to generate NO and NO_2. Nitrous oxide (N_2O) is generated as an undesired by-product through the side reaction of ammonia oxidation as follows:

$4NH_3 + 5O_2 \rightarrow 4NO + 6H_2O$ (Main reaction)

$2NO + O_2 \rightarrow 2NO_2$ (Desired in the NO oxidation process)

$4NH_3 + 3O_2 \rightarrow 2N_2 + 6H_2O$ (Side reaction)

$4NH_3 + 4O_2 \rightarrow 2N_2O + 6H_2O$ (Side reaction generating N_2O and release N_2O in the tail gas)

N_2O is recognized as a potent greenhouse gas with a Global Warming Potential (GWP) of 310 compared to carbon dioxide (CO_2), i.e. GWP_{N2O} = 310. De-N_2O system (NAS, N_2O abatement system) used in this project is to destruct the N_2O included in tail gas by catalyst without any reducing agent. Then greenhouse gas emission reductions are generated. The annual estimated emission reductions are 660,995tCO_2e.

$2N_2O \rightarrow 2N_2 + O_2$

The catalytic reactor designed by Hyosung Ebara Engineering Co., Ltd. was derived from RTO (Regenerative Thermal Oxidizer), to save the energy required for catalytic reaction to decompose N_2O, and this N_2O destruction facility is the so-called “Regenerative Catalytic System”. Liquefied natural gas (LNG, hereafter “natural gas”) is used in this system as a fuel, not reducing agent, to supply the energy required for the de-N_2O catalytic reaction. The N_2O decomposing catalyst is provided by CRI, a wholly owned subsidiary of the Shell Group of Company, and it is designed and installed by Hyosung Ebara Engineering Co., Ltd.

The Project has been registered on 09/06/2011 (UNFCCC ref. No. 4665) under approved CDM methodology AM0028 Version 05 *Catalytic N2O destruction in the tail gas of Nitric Acid or Caprolactam Production Plants* /7/. The Project has chosen the fixed crediting period in the registered PDD, and the fixed crediting period is from 09/06/2011 - 08/06/2021.

Project title:	N2O Abatement Project of Capro Corporation
UNFCCC ref number:	4665
Registration Date:	09/06/2011, with the registered PDD version 8.1 dated 24/05/2011
Crediting Period:	09/06/2011 - 08/06/2021 (fixed)
Monitoring Period:	01/09/2011 to 31/12/2011
Project Participants:	The Republic of Korea (host party): Capro Corporation; Hyosung Ebara Engineering Co., Ltd.; and Hyosung Corporation
Methodologies used	AM0028 Version 05 Catalytic N2O destruction in the tail gas of Nitric Acid or Caprolactam Production Plants
Location of the Project:	in Bugok-dong, Nam-gu, Ulsan, the south-eastern part of the Republic of Korea
Geo coordinates:	Longitude: 129.3280E, Latitude: 35.4958N
UNFCCC view page:	http://cdm.unfccc.int/Projects/DB/TUEV-SUED1302245900.58/view

[Post Registration Changes]

No post registration changes have been requested.

1.4. Verification Team

The assessment team and internal technical reviewer team consist of the following personnel:

FUNCTION	NAME	TA 5.1	TASK PERFORMED*
Team Leader	Mr. (Ernesto) Tan Wenbin	☐	☒**DR** ☒**SV** ☒**RI** ☐**TR**
Team Member	N/A	☐	☐**DR** ☐**SV** ☐**RI** ☐**TR**
Technical Specialist	Mr. (Jony) Li Qing	☒	☒**DR** ☒**SV** ☐**RI** ☐**TR**
Internal Technical Reviewer (ITR)	Ms. (Coco) Geng Yan	☐	☐**DR** ☐**SV** ☐**RI** ☒**TR**
Specialist supporting ITR	Ms. An Baifang	☒	☐**DR** ☐**SV** ☐**RI** ☒**TR**

*DR = Document Review; SV = Site Visit; RI = Report issuance; TR = Internal Technical Review

2. METHODOLOGY

The overall verification, from Contract Review to Verification Report & Opinion, was conducted using Bureau Veritas Certification internal procedures.

In order to ensure transparency, a verification protocol was customized for the project, according to the version 02.0 of the Clean Development Mechanism Validation and Verification Standard, issued by CDM Executive Board at its 65th meeting on 25/11/2011 /8/. The protocol

shows, in a transparent manner, criteria (requirements), means of verification and the results from verifying the identified criteria. The verification protocol serves the following purposes:

- It organizes, details and clarifies the requirements a CDM project is expected to meet;
- It ensures a transparent verification process where the verifier will document how a particular requirement has been verified and the result of the verification.

The completed verification protocol is enclosed in Appendix A to this report.

2.1. Review of Documents

The assessment of the project documentation provided by the project participant is based upon both quantitative and qualitative information on emission reductions. Quantitative information comprises the reported numbers in the monitoring report (MR) version 4.0 dated 03/12/2012 /4/ and emission reduction calculation spreadsheet /5/. Qualitative information comprises information on internal management controls, calculation procedures, procedures for transfer of data, frequency of emissions reports, and review and internal audit of calculations.

The Monitoring Report Version 3.0 dated 15/10/2012 submitted by the project participant was also web hosted on the UNFCCC-CDM web site on 29/10/2012 and thus, was available in the public domain.

In addition to the monitoring documentation provided by the project participants, the DOE reviews:

(a) The registered PDD including the monitoring plan and the corresponding validation report /1//2/;

(b) The monitoring report and the verification of the previous periodic verification /6/;

(c) The applied monitoring methodology /7/;

(d) Relevant decisions, clarifications and guidance from the CMP and the CDM Executive Board /8/;

2.2. Follow-up Interviews

On 21/11/2012, Bureau Veritas Certification performed a site visit and interviews with project stakeholders to confirm selected information and to resolve issues identified in the document review. Representatives of Capro Corporation; Hyosung Ebara Engineering Co., Ltd.; and Hyosung Corporation were interviewed (see References). The main topics of the interviews are summarized in Table 1.

Table 1 Interview topics

Interviewed organizations	Interview topics
Capro Corporation; Hyosung Ebara Engineering Co., Ltd.; and Hyosung Corporation	➢ Project Design and implementation ➢ Technical equipment, calibration and operation ➢ Monitoring Plan and management procedures ➢ Monitoring data ➢ Data uncertainty and residual risks (QA/QC) ➢ GHG Calculation ➢ Environmental Impacts ➢ Compliance with National Laws and Regulations ➢ Monitoring Plan ➢ Monitored data and Monitoring Report ➢ GHG Calculation

2.3. Resolution of Clarification, Corrective and Forward Action Requests

The objective of this phase of the verification is to resolve issues related to the monitoring, implementation and operations of the registered project activity that could impair the capacity of the registered project activity to achieve emission reductions or influence the monitoring and reporting of emission reductions prior to Bureau Veritas Certification's positive conclusion on the GHG emission reduction calculation.

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

A Corrective Action Request (CAR) is raised, if one of the following situations occurs:

(a) Non-compliance with the monitoring plan or methodology are found in monitoring and reporting and has not been sufficiently documented by the project participants, or if the evidence provided to prove conformity is insufficient;

(b) Modifications to the implementation, operation and monitoring of the registered project activity has not been sufficiently documented by the project participants;

(c) Mistakes have been made in applying assumptions, data or calculations of emission reductions that will impact the quantity of emission reductions;

(d) Issues identified in a FAR during validation to be verified during verification or previous verification(s) have not been resolved by the project participants.

A Clarification Request (CL) is raised, if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

A Forward Action Request (FAR) is raised, for actions if the monitoring and reporting require attention and/or adjustment for the next verification period.

To guarantee the transparency of the verification process, the concerns raised are documented in more detail in the verification protocol in Appendix A.

2.4. Internal Technical Review

The verification report underwent an Internal Technical Review (ITR) before requesting issuance of CERs for the project activity.

The ITR is an independent process performed to examine thoroughly that the process of verification has been carried out in conformance with the requirements of the verification scheme as well as internal Bureau Veritas Certification procedures.

The Team Leader provides a copy of the verification report to the reviewer, including any necessary verification documentation. The reviewer reviews the submitted documentation for conformance with the verification scheme. This will be a comprehensive review of all documentation generated during the verification process.

When performing an Internal Technical Review, the reviewer ensures that:

- The verification activity has been performed by the team by exercising utmost diligence and complete adherence to the CDM rules and requirements.
- The review encompasses all aspects related to the project which includes project design, baseline, additionality, monitoring plans and emission reduction calculations, internal quality assurance systems of the project participant as well as the project activity, review of the stakeholder comments and responses, closure of CARs, CLs and FARs during the verification exercise, review of sample documents.

The reviewer may raise Clarification Requests to the verification team and discusses these matters with Team Leader.

After the agreement of the responses on the Clarification Requests from the verification team as well as the PP(s), the finalized verification report is accepted for further processing such as uploading via the UNFCCC interface.

3. VERIFICATION CONCLUSIONS

In the following sections, the conclusions of the verification are stated.

The findings from the desk review of the original monitoring documents and the findings from interviews during the follow up visit are described in the Verification Protocol in Appendix A.

The Clarification, Corrective and Forward Action Requests are stated, where applicable, in the following sections and are further documented in the Verification Protocol in Appendix A. The verification of the Project resulted in 1 CAR and 1 CL.

The CAR and CL were closed based on adequate responses from the Project Participant(s) which meet the applicable requirements. They have been reassessed before their formal acceptance and closure.

The number between brackets at the end of each section corresponds to the VVS paragraph.

3.1. Remaining issues from validation or previous verification (213)

All CARs and CLs raised were successfully closed during the validation stage and the first (previous) periodic verification, no remaining issues were left.

3.2. Compliance of the project implementation with the registered project design document (228)

Bureau Veritas Certification has performed an on-site visit and found that the Project has been put into operation in compliance with the registered PDD. No notification or approval of changes has been requested for the Project. During the site visit, no changes from the project activity as described in the registered PDD have been observed or identified. Hence there is no need to request for notification or approval of changes.

During the process of the ammonia oxidation in AOR of the caprolactam production, N_2O is generated as an undesired by-product through the side reaction of Ammonia oxidation:

$4NH_3 + 5O_2 \rightarrow 4NO + 6H_2O$ (Main reaction)

$2NO + O_2 \rightarrow 2NO_2$ (Desired in the NO oxidation process)

$4NH_3 + 3O_2 \rightarrow 2N_2 + 6H_2O$ (Side reaction)

$\mathbf{4NH_3 + 4O_2 \rightarrow 2N_2O + 6H_2O}$ (Side reaction generating N_2O and release N_2O in the tail gas)

De-N_2O system (NAS, N_2O abatement system) used in this project is to destruct the N_2O included in tail gas by catalyst without any reducing agent. The catalytic reactor designed by Hyosung Ebara Engineering Co., Ltd. was derived from RTO (Regenerative Thermal Oxidizer), to save the energy required for catalytic reaction to decompose N_2O, and this N_2O destruction facility is the so-called “Regenerative Catalytic System”. Liquefied natural gas (LNG, hereafter “natural gas”) is used in this system as a fuel, not reducing agent, to supply the energy required for the de-N_2O catalytic reaction. The N_2O decomposing catalyst is provided by CRI, a wholly owned subsidiary of the Shell Group of Company, and it is designed and installed by Hyosung Ebara Engineering Co., Ltd.

The implementation history of the Project is shown in the following Table 2:

Table 2 Implementation history

Date/time	Events
16/11/2010	Started Construction of N_2O abatement system /9/
20/04/2011	Commissioning started (Plant 1) /10/
27/04/2011	Commissioning started (Plant 2) /11/
02/05/2011	Completed Construction of N_2O abatement system and the N_2O abatement system started normal operation /12/
23/05/2011~27/05/2011	Field Test for Quality Assurance of installation and calibration of AMS (QAL2) /22/
26/09/2011~29/09/2011	Additional Field Test for Quality Assurance of installation and calibration of AMS (QAL2) /22/

Bureau Veritas Certification checked the documented evidence /9/ /10/ /11/ /12/ /22/ and can confirm the above implementation history is consistent with the documented evidence. Besides, the special events of the Plant I and Plant II included in the section B of the monitoring report are consistent with the information recorded in the EEU /13/.

Information provided in the monitoring report is in accordance with that stated in the registered PDD. Further analysis of monitored parameters as reported in the monitoring report compared to those estimated in the PDD is developed in section 3.6 of this report.

✌ Corresponding to the paragraph 228 of VVS version 02.0, Bureau Veritas Certification can confirm that:

- The implementation of the Project is consistent with the registered PDD.
- The Project is operated as per the registered PDD by the PP.
- Information provided in the MR is in accordance with that stated in the registered PDD.

3.3. Compliance of the monitoring plan with the monitoring methodology including applicable tool(s) (232)

Bureau Veritas Certification has verified the monitoring plan contained in the registered PDD, including the data and parameters required to be monitored, measurement procedures, monitoring frequency and QC/QA procedures.

- Corresponding to the paragraph 232 of VVS version 02.0, Bureau Veritas Certification can confirm that the monitoring plan contained in the registered PDD is in accordance with the approved methodology including applicable tool(s) applied by the Project.

3.4. Compliance of monitoring activities with the monitoring plan (235-236)

Monitoring has been carried out in accordance with the monitoring plan contained in the registered PDD.

[Management and Operation]

The PP has operated the Project as per the registered PDD. The monitoring organization has been set up and all monitoring staffs have been trained /28//29/. The monitoring parameters are measured by the PP as per the approved frequency included in the registered PDD. CDM Monitoring & Management Manual and CDM monitoring internal training records have been provided and verified by Bureau Veritas Certification. Bureau Veritas Certification also checked the emergency procedures contained in the CDM Monitoring & Management Manual /28/ and is able to confirm that it complies with the registered PDD.

[Metering System]

Monitoring points are shown in the following Figure 1 and Figure 2. The monitoring equipments were installed as per the following diagram, where the monitoring parameters are indicated. Bureau Veritas Certification has onsite checked the monitoring equipments and reviewed the Diagram of production process included in the registered PDD and is able to confirm the information of monitoring points provided in the monitoring report is valid. Bureau Veritas Certification also onsite checked the tag No. of the monitoring equipments, which are included in the monitoring report, and can confirm that they are consistent with those in the registered PDD, except for the tag No. of the monitoring parameters of the N_2O concentration and CH_4 concentration at destruction facility outlet (CO_{N2O-1}, CO_{CH4-1},CO_{N2O-2}, and CO_{CH4-2}). These four tag numbers are changed for distinguishing each other. All the monitoring equipments have been properly installed, maintained, calibrated and recorded according to relevant standard.

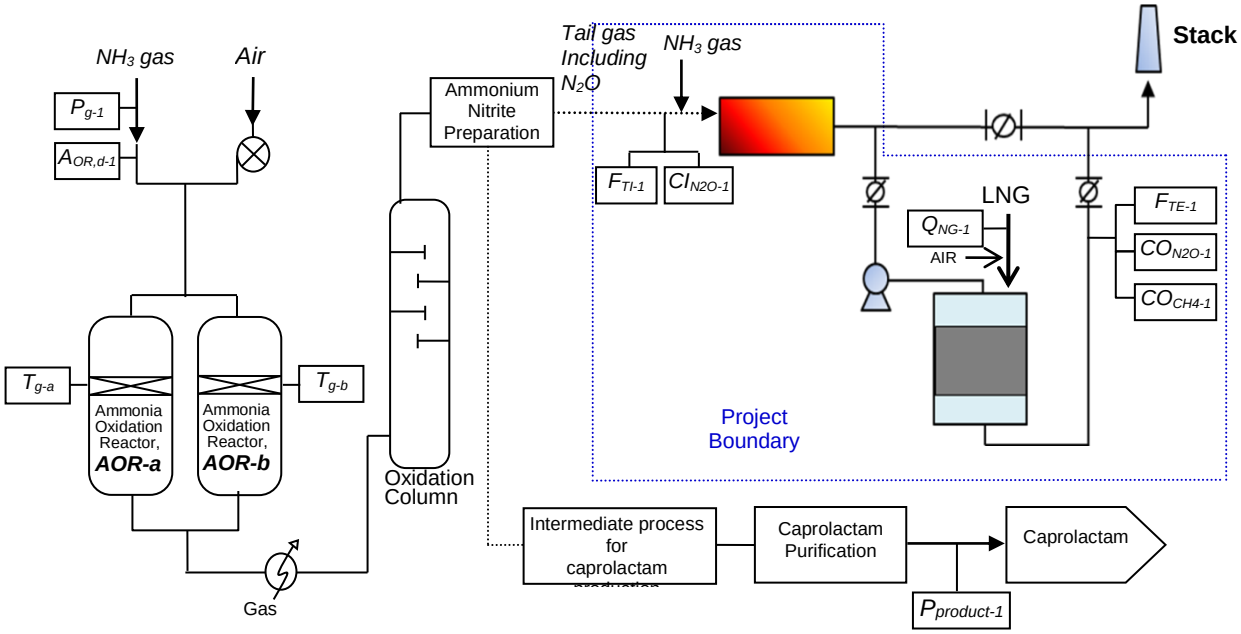

Figure 1 Monitoring points of Plant 1

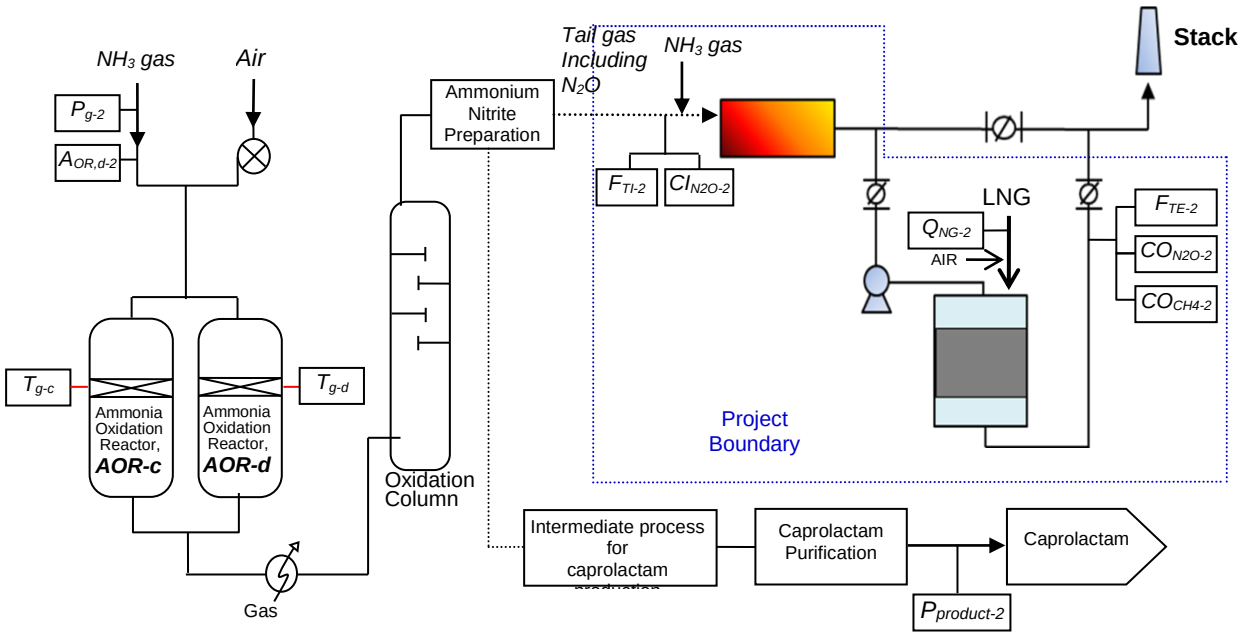

Figure 2 Monitoring points of Plant 2

The metering equipments are listed in the following Table 3

Table 3 metering equipments

Monitoring parameters	Metering equipments
$A_{OR,d-1}$ and $A_{OR,d-2}$	Differential pressure transmitter with normalizing functions
P_{g-1} and P_{g-2}	Pa gauge
T_{g-a}, T_{g-b}, T_{g-c} and T_{g-d}	Thermocouples
F_{TI-1} and F_{TI-2}	Ultrasonic flow meters with normalizing functions
F_{TE-1} and F_{TE-2}	Ultrasonic flow meters with normalizing functions
CI_{N2O-1} and CI_{N2O-2}	Non-dispersion infrared absorption analyzer (NDIR)
CO_{N2O-1} and CO_{N2O-2}	Non-dispersion infrared absorption analyzer (NDIR)
Q_{NG-1} and Q_{NG-2}	Flow meter with normalizing functions
CO_{CH4-1} and CO_{CH4-2}	Non-dispersion infrared absorption analyzer (NDIR), same as CO_{N2O-1} and CO_{N2O-2}
$P_{product-1}$ and $P_{product-2}$	Mass flow meters

Note: the subscripts 1 and 2 refer to the Plant I and Plant II respectively, while the subscripts a, b, c, and d refer to the four AORs.

The data of the AOR operating parameters ($A_{OR,}$ T_g, P_g) and the productivity of caprolactam ($P_{product}$) are logged and stored by the existed DCS (Distributed Control System) which has been independently operated for Plant I and II before the implementation of this project.

Besides, the data of DAS (Data Acquisition System) is newly installed to log the relevant data to the N_2O decomposition amount and CH_4 emission by operating N_2O abatement system. DAS consists of an 'Electronic Evaluation Unit (EEU)' and two of 'Data Communication Units (DCUs)' located at Plant I and II.

Major function of DCU is to record the raw measurement data from Automated Measuring System (AMS), i.e. N_2O emission at the two monitoring points of the inlet and outlet of N_2O destruction facility, and to transmit those to EEU. DCU can store temporarily the record of raw measurement data with the ring memory of 16days minute values. In addition, the data of AOR operation and caprolactam productivity are delivered from DCS and recorded by DCU respectably, and then transmitted to EEU. Q_{NG} is measured by Flow meter separately installed from AMS and CO_{CH4} are also measured at the outlet by dual channel-NDIR by which the concentration of N_2O and CH_4 is measured separately. Therefore it is aggregated,

recorded and stored by EEU that not only the AMS data but also the AOR data and productivity data. However, if there is a discrepancy between the DCS data and the EEU and/or DCU data, DCS data should be taken. Bureau Veritas Certification randomly checked some DCS data and the EEU and/or DCU data and no discrepancy was found.

Bureau Veritas Certification checked the Test report of the D-EMS 2000 System dated 07/2011 /27/ and can confirm that the information of the DCU, EEU, External Hard Disk Drive (HDD) provided in the Table C.1 of the monitoring report is valid. The new PC for back-up is in-place to display and record the hourly data from EEU, the monthly data of supplied LNG, and the other information including the events list, working diary and so on.

[Quality Assurance of Automated measuring system]

The latest European Norm EN 14181:2004 which is required to be used as the basis for selecting and operating the automated measuring system (AMS) under methodology AM0028 Version 05, stipulates three levels of Quality Assurance Levels (QAL), and one Annual Surveillance Test (AST) /19/.

QAL1 is a quality test procedure, which shall be conducted before the installation of the measurement equipments in the plants. The test was performed by the manufacturer of the AMS. The monitoring report shows the records of QAL1 of the AMS equipments in the Table C.2 (a) Information of the quality assurance of tested AMS located in Plant I and Table C.2 (b) Information of the quality assurance of tested AMS located in Plant II. Bureau Vertias Certification checked the QAL 1 records of the AMS monitoring equipments /21/ is able to confirm that the information provided in the Table C.2 (a) and Table C.2 (b) in the monitoring report is consistent with the documented evidence /24/, the evaluation has been carried out by the manufacturer before installation of AMS, and the evaluation is deemed to be acceptable.

QAL2 is a procedure to calibrate the AMS and determine the variability of the measured values obtained by it, so as to demonstrate the suitability of the AMS for its application, following its installation. The QAL2 test was performed twice, from 23/05/2011 to 27/05/2011 and from 26/09/2011 to 29/09/2011 by AIR-TEC /22/. Bureau Veritas Certification checked the QAL2 test reports /22/ and can confirm that the reports conclude that the AMS complies with QAL2 requirements within EN 14181. The results to the tests for QAL2 were summarized on the QAL 2 reports in the major items following:

(a) Section of the location of measurement
(b) Duly installation of the monitoring equipment
(c) Correct choice of measurement range
(d) Calibration of AMS using the standard-Reference-Method(SRM) as guidance
(e) Calibration curve either as linear regression or as straight line from absolute zero to centre of a scatter-plot
(f) Calibration of the standard deviation at the 95% confidence interval

QAL3 is a procedure to maintain and demonstrate the results obtained during normal operations of an AMS, by checking that the zero and span characteristics are consistent with those determined during QAL1. QAL 3 has been implemented since the project start up, which includes:

(a) Permanent quality assurance during the plant operation by the operating staff
(b) Assurance of reliable and correct operation of the monitoring equipment
(c) Regular controls : zero point, span, drift, meet schedule of manufacturer maintenance intervals

The Bureau Vertias Certification checked the zero/span test records /23/ and is able to confirm that the QAL3 test complies with the requirements within EN 14181 and the results were without significant deviation.

The AST is a procedure for annual surveillance tests on the system to ensure that its performance remains as previously determined. Since the total length of 1st and 2nd monitoring period is less than one year, annual surveillance test has not been carried out yet. Bureau Veritas Certification can accept this procedure, and does not doubt the validity of the conformity of the AMS with the EN14181:2004.

[Calibration] /24//26/

All the monitoring equipments were calibrated in accordance with the requirements included in the monitoring plan. The calibration information is listed in the following Table 4.

Table 4 Calibration information of the monitoring equipments

Monitoring equipment type	Tag number	Monitoring parameter	Serial number	Accuracy class	Calibration frequency	Last calibration date	Validity
Differential pressure transmitter with normalizing functions	FIC-1201	$A_{OR,d-1}$	10530360038	± 0.1%	Every 2 years	11/01/2010	Yes
	2FIC-1201	$A_{OR,d-2}$	10530360080	± 0.1%	Every 2 years	11/03/2010	Yes
Gauge pressure (Pa gauge)	PI-1205	P_{g-1}	10530360183	± 0.1%	Every 2 years	11/01/2010	Yes
	2PI-1205	P_{g-2}	10530360212	± 0.1%	Every 2 years	11/03/2010	Yes
Thermocouples	TI-1204	T_{g-a}	2170447	Maximum error 300°C: +0.00°C 500°C: +0.35°C 700°C: +0.98°C	Every 2years	13/05/2011	Yes
	TI-1206	T_{g-b}	09002677 (before replacement)	Maximum error ± 0.75°C	Every 2years	13/05/2011	Yes
			2170445 (after replacement) *	Maximum error 300°C: +0.00°C 500°C: +0.35°C 700°C: +0.98°C	Every 2years	17/10/2011	Yes

* The measuring instrument for T_{g-b} was replaced on 17/10/2011. Bureau Veritas Certification has checked the replacement record /25/ and can confirm the replacement did not impact the monitoring activity. The required data of the parameter T_{g-b} after 17/10/2011 was measured by the instrument with serial No. 2170445. The accuracy class of the instrument before and after the replacement complies with the requirement of the registered PDD.

Monitoring equipment type	Tag number	Monitoring parameter	Serial number	Accuracy class	Calibration frequency	Last calibration date	Validity
	2TI-1204	T_{g-c}	24001	Maximum error 300°C: -0.7°C 500°C: -0.1°C 700°C: -0.7°C	Every 2years	23/05/2011	Yes
	2TI-1206	T_{g-d}	24002	Maximum error 300°C: -0.7°C 500°C: -0.1°C 700°C: -0.7°C	Every 2years	23/05/2011	Yes
Ultrasonic flow meters with normalizing functions	FI-1521	F_{TI-1}	• HEAD A: 1217007 • HEAD B: 1217008 • Evaluation Unit :1216861 • Case of Evaluation : 1216999	< 2%	Every day by Auto calibration manner	31/12/2011	Yes
	2FI-1521	F_{TI-2}	• HEAD A: 1217011 • HEAD B: 1217012 • Evaluation Unit :1216866 • Case of Evaluation : 1217002	< 2%	Every day by Auto calibration manner	31/12/2011	Yes
Ultrasonic flow	FI-1522	F_{TE-1}	•HEAD A: 1217009	< 2%	Every day by Auto calibration	31/12/2011	Yes

Monitoring equipment type	Tag number	Monitoring parameter	Serial number	Accuracy class	Calibration frequency	Last calibration date	Validity
meters with normalizing functions			•HEAD B: 1217010 • Evaluation Unit : 1216862 • Case of Evaluation : 1217001		manner		
	2FI-1522	F_{TE-2}	•HEAD A: 1217013 •HEAD B: 1217014 • Evaluation Unit : 1216867 • Case of Evaluation : 1217003	< 2%	Every day by Auto calibration manner	31/12/2011	Yes
Non-dispersion infrared absorption analyzer (NDIR)	AI-1521	CI_{N2O-1}	AO-748	>95% (repeatability)	Every 2 weeks	28/12/2011	Yes
	2AI-1521	CI_{N2O-2}	AO-749	>95% (repeatability)	Every 2 weeks	28/12/2011	Yes
Non-dispersion infrared absorption analyzer (NDIR)	AI-1522(a) AI-1522(b)	CO_{N2O-1} and CO_{CH4-1}	AO-750	>95% (repeatability)	Every 2 weeks	28/12/2011	Yes
	2AI-1522(a)	CO_{N2O-2} and	AO-751	>95%	Every 2 weeks	28/12/2011	Yes

Monitoring equipment type	Tag number	Monitoring parameter	Serial number	Accuracy class	Calibration frequency	Last calibration date	Validity
	2AI-1522(b)	CO_{CH4-2}		(repeatability)			
Flow meter with normalizing functions	FI-1523	Q_{NG-1}	02319622	±0.90%	Every 2 years	12/03/2010	Yes
	2FI-1523	Q_{NG-2}	02319623	±0.90%	Every 2 years	12/03/2010	Yes
Mass flow meters	FR-7705	$P_{product-1}$	6T 681125	± 0.10%	Every 2 years	07/10/2010	Yes
	2FI-7705	$P_{product-2}$	28 529138	± 0.15%	Every 2 years	07/10/2010	Yes

Bureau Veritas Certification has on-site checked the monitoring equipments which are not auto calibrated and verified the calibration records /24/ issued by the calibration organizations and the accreditation certificates /26/ of the calibration organizations. Each calibration was conducted within the accreditation period of the calibration organizations. Bureau Veritas Certification can confirm that all the monitoring equipments are within suitable accuracy level and consistent with the registered PDD. The calibration frequency complies with the requirements of the Monitoring Plan.

[Parameters and information flow]

Parameters monitored:

The parameters required by the monitoring plan and the way Bureau Veritas Certification has verified the information flow including the values in the monitoring reports are described below:

Parameters required to be monitored by AMS ($F_{TI,i}$, $CI_{N2O,i}$, $F_{TE,i}$ and $CO_{N2O,i}$; $F_{TI,i}$,

$CI_{N2O,i}$, $F_{TE,i}$ and $CO_{N2O,i}$) /18/

The Parameters required to be monitored by AMS include the following parameters:

$F_{TI,i}$	**(F_{TI-1} and F_{TI-2})**	Volume flow rate at the inlet of the destruction facility
$F_{TE,i}$	**(F_{TE-1} and F_{TE-2})**	Volume flow rate at the exit of the destruction facility
$CI_{N2O,i}$	**(CI_{N2O-1} and CI_{N2O-2})**	N_2O concentration at destruction facility inlet
$CO_{N2O,i}$	**(CO_{N2O-1} and CO_{N2O-2})**	N_2O concentration at destruction facility outlet

Raw measurement data of volume flow rate parameters is measured using Ultrasonic flow meters with normalizing functions, while raw measurement data of N_2O concentration parameters is measured using Non-dispersion infrared absorption analyzers (NDIR). DCUs record the raw measurement data, and transmit those to EEU. The hourly recording frequency is more frequently than the requirements in the registered PDD.

The parameter F_{TI} is determined conservatively as per the procedure described in the monitoring report. In order to achieve conservative approach, the measured inlet flow (F_{TI}) would be adjusted to the value (F_{TI}*) by the below equation.

$$F_{TI}^{*} = \min\left[F_{TI}; \left(\frac{F_{TE}}{1+VEF} - Q_{NG} \times \frac{Q_{NGcombustionGas}}{Q_{NG}}\right)\right]$$

Where:

F_{TI}^{*}	Conservative volume flow at the inlet of destruction facility used for emission reduction calculation (Nm^3/h)

F_{TI}	Measurement value by a flow meter at inlet of destruction facility (Nm^3/h)
F_{TE}	Measurement value by a flow meter at outlet of destruction facility (Nm^3/h)
Q_{NG}	Natural gas input for re-heating the tail gas (Nm^3/h)
$Q_{NG\ combustion\ gas}$	Combustion gas of natural gas (Nm^3/h)
VEF	Volumetric Expansion Factor

Bureau Veritas has checked the Emission Reductions Calculation Spreadsheet and can confirm that the calculation of the $Q_{NG\ combustion\ gas}$ is correct and this conservative approach is correctly applied to determine the F_{TI}. VEF was determined as 0.001. This value of VEF is applied as a fixed official value. Bureau Veritas Certification checked the documented evidence /15/ and can confirm the determination of the VEF complies with the registered PDD.

Parameters recorded by DCS ($P_{product,y}$, $T_{g,d}$, $P_{g,d}$, $A_{OR,d}$) /17/

$P_{product,y}$ ($P_{product-1}$ and $P_{product-2}$)	Plant output of caprolactam
$T_{g,d}$ (T_{g-a}, T_{g-b}, T_{g-c} and T_{g-d})	Actual daily (*d*) operating temperature of the ammonia oxidation reactor
$P_{g,d}$ (P_{g-1} and P_{g-2})	Actual operating pressure of the ammonia oxidation reactor on day *d*
$A_{OR,d}$($A_{OR,d-1}$ and $A_{OR,d-2}$)	Actual ammonia flow rate to the ammonia oxidation reactor (AOR)

Raw measurement data of plant output of caprolactam is measured using mass flow meter, raw measurement data of operating temperature of the AORs is measured using thermocouple, raw measurement data of operating pressure of the AORs is measured using pressure gauge, while raw measurement data of ammonia flow rate to the AORs is measured using differential pressure transmitter with normalizing functions. DCSs record the raw measurement data, and transmit those to DCUs. The hourly recording frequency is more frequently than the requirement in the registered PDD. Cross-check of amount of the produced caprolactam ($P_{product,y}$) is performed on the basis of stock change data and weighbridge data. Bureau Veritas Certification randomly selected and checked some data of stock change and weighbridge, and can confirm that the crosscheck process of the $P_{product,y}$ is reasonable and valid, and no error was found between the reported values and the stock

change/weighbridge data.

Bureau Veritas Certification has checked the information flows for generating, aggregating and reporting the monitoring parameters, raw data for AMS parameters and DCS parameters and the data monitoring procedures including the monitoring frequency and data transference of the these parameters through the onsite checking the monitoring system, interactions with the management representatives and operators of the PP and document review, and can confirm that they are in compliance with the requirements included in the methodology AM0028 Version 05. Bureau Veritas Certification has verified and cross-checked the reported values by comparing randomly sampled values from the spreadsheets to the values stored in the EEU. No errors were found in the data transfer.

Parameters related to ammonia oxidation catalyst (G_{sup}, G_{com})

G_{sup} Supplier of the ammonia oxidation catalyst, and

G_{com} Composition of the ammonia oxidation catalyst

Bureau Veritas Certification can confirm that the data of G_{sup} and G_{com} sourced from the Supplier information on catalyst delivery confirmation document /14/ is realistic.

Parameters related to natural gas ($Type_{HC}$, CF_{CH4}, $Q_{NG,y}$, ρ_{NG}, CO_{CH4})

$Type_{HC}$ (Type of hydrocarbon / Natural gas) and CF_{CH4} (Methane content of hydrocarbon, natural gas) are sourced from natural gas supplier KyungDong city gas CO., Ltd. $Q_{NG,y}$ (Natural gas input for re-heating the tail gas) is measured using flow meter with normalizing functions, and the hourly recording frequency is more frequently than the requirement in the registered PDD. ρ_{NG} (Density of the natural gas) is sourced from monthly report provided by the fuel supplier. CO_{CH4} (Methane concentration at destruction facility outlet) is measured using non-dispersion infrared absorption analyzer with dual-channel as a gas path and the hourly recording frequency is more frequently than the requirement in the registered PDD.

Calculated parameters ($Q_{CH4,d}$, $Q_{HC,y}$, ρ_{HC}, EF_{NG}, EF_{HC}, SE_{N2O})

$Q_{CH4,d}$ Methane part of the natural gas used

It is calculated with the following formula:

$$Q_{CH4,y} = Q_{NG,y} \times CF_{CH4}$$

$Q_{HC,y}$ The hydrocarbon with two or more molecules of carbon in natural gas

It is calculated with the following formula:

$$Q_{HC,y} = Q_{NG,y} \times (1 - CF_{CH4})$$

ρ_{HC} Density of the hydrocarbon with two or more molecules of carbon in natural gas

It is calculated with the following formula:

$$\rho_{HC} = (\rho_{NG} - \rho_{CH4} \times CF_{CH4}) / (1 - CF_{CH4})$$

EF_{NG} Emission factor of the natural gas

It is calculated with the following formula:

$$EF_{NG} = COEF_{NG} \times NCV_{NG} / \rho_{NG} \times 44/12$$

Where

$COEF_{NG}$ Carbon Emission factor of natural gas [tC/TJ]
15.3[tC/TJ] is applied to this project as Ex-ante value by IPCC DEFAULT VALUES OF CARBON CONTENT of "Natural Gas" in TABLE 1.3 (2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 2, Energy)

NCV_{NG} Net calorific value of the natural gas [TJ/Nm^3]
For this project, NCV_{NG} is offered by KOGAS.

ρ_{NG} Density of the natural gas[t/Nm^3]
For this project, based on data source by natural gas supplier.

EF_{HC} Emission factor of the hydrocarbon with two or more molecular of carbon, which is existed as a contents of the natural gas

It is calculated with the following formula:

$$EF_{HC} = (EF_{NG} \times \rho_{NG} - EF_{CH4} \times \rho_{CH4} \times CF_{CH4}) / (1 - CF_{CH4}) / \rho_{HC}$$

Where

EF_{NG} : CO_2 emission factor of NG[tCO_2/tNG
ρ_{NG} : Density of natural gas (tNG/m^3)
EF_{CH4} : CO_2 emission factor of CH_4(tCO_2/tCH_4).
ρ_{CH4} : Density of methane (tCH_4/ m^3).
CF_{CH4} : Methane fraction in the natural gas

SE_{N2O} N2O emission rate per ton of caprolactam

It is calculated with the following formula:

$$SE_{N2O,period} = QI_{N2O,period} / P_{product,period} \times 1000$$

Where, $QI_{N2O,y}$ means Quantity of N_2O emissions at the inlet of the destruction facility (t N_2O)

$OXID_{CH4}$ Oxidation factor of CH_4 in natural gas for re-heating tail gas

It is calculated with the following formula:

$$OXID_{CH4}=\{ Q_{CH4} -(\sum_{i}^{n} F_{TE,i} \times CO_{CH4,i} \times 10^{-6})\} / Q_{CH4} \times 100$$

Regarding the above formulae, both the subscripts d (day) and y means the period. Bureau Veritas Certification can confirm that the above formulae are correct and calculation of these parameters is valid.

Reg_{NOx} (National regulation on NO_X emissions) and **$RSE_{N2O,y}$** (regulatory limit of N_2O emissions per unit of outlet of caprolactam)

According to the "Clean Air Conservation Act", one of the National environmental legislation, Ministry of Environment, the permitted values of NO_X emissions is 4.10714E-7 tNO_x/Nm^3 (as a NO_2 concentration). According to the National legislation in Republic of Korea, there is no regulatory limit of N_2O emissions per unit of outlet of caprolactam **($RSE_{N2O,y}$).**

Bureau Veritas Certification has verified the information flow provided in the monitoring report /4/ through onsite check and document review, i.e. interactions with the management representatives and operators of the PP, checking the nitric acid production line, checking the monitoring system, checking the monitoring management and organization, reviewing the CDM monitoring & management manual /28/, training records /29/ and all the data records /13/ and can confirm that the information flow of all the monitoring parameters complies with the monitoring plan and the methodology AM0028 Version 05.

Parameters determined at registration:

There are values of the parameters contained in the section D.1, including the following parameters:

GWP_{N2O} and GWP_{CH4}	global warming potentials of N_2O and CH_4
$P_{product, max}$	Design capacity of caprolactam production
historical production data of AORs:	
$A_{OR,hist}$	maximum ammonia flow rate
$T_{g,hist}$ and $P_{g,hist}$	operating temperature and pressure range
$G_{sup,hist}$ and $G_{com,hist}$	ammonia oxidation catalyst supplier and composition
$OXID_{HC}$	Oxidation factor of natural gas with two or more molecules of carbon
EF_{CH4} and ρ_{CH4}	methane emission factor and density
M_i	length of measuring interval
Reg_{NOx}	national regulation on NO_X emissions

Bureau Veritas Certification compared the values included in the section D.1 of the monitoring report to those values included in the section 6.2 of the registered PDD and can confirm that the

values of these parameters included in the monitoring report are the same as those in the registered PDD.

- Corresponding to the paragraph 235 and 236 of VVS version 02.0, Bureau Veritas Certification can confirm that:

- The monitoring has been carried out in accordance with the monitoring plan contained in the registered PDD.

- All parameters required by the monitoring plan contained in the registered PDD have been sufficiently monitored and correctly listed. The monitored data for required parameters have been verified by checking the whole information flow.

3.5. Compliance with the calibration frequency requirements for measuring instruments (243)

During this monitoring period, the installed measuring instruments have been operating well and were duly calibrated. Calibration information is described in the section 3.4 above. The monitoring instruments meet the rated accuracy level as described in the monitoring plan contained in the registered PDD. The calibration frequency fulfills the requirement as described in the monitoring plan contained in the registered PDD.

- Corresponding to the paragraph 243 of VVS version 02.0, Bureau Veritas Certification can confirm that:

- The calibration is conducted at the frequency as specified by the methodology and the monitoring plan contained in the registered PDD.

3.6. Assessment of data and calculation of emission reductions (246)

A complete set of data for the specified monitoring period to calculate the emission reductions is available. The data pertaining to the above parameters are maintained in the identified records. All the data are in compliance with that stated in the Monitoring Report version 4.0 /4/. Values regarding errors readings (e.g. downtime, malfunction or special events), and extreme values were eliminated to recalculate the baseline emissions.

Appropriate methods and formulae for calculating baseline emissions, project emissions and leakage have been followed. The assumptions, emission factors and default values that were applied in the calculations have been justified and found to be valid.

[Baseline emissions]

Based on the production of caprolactam during this monitoring period, the daily average of the production ($P_{product,y}$) did not exceed the design capacity ($P_{product,max}$) for both nitric acid plants. Therefore on the assumption $P_{product,y} < P_{product,max}$, baseline emissions ($BE$) for this period are

given by following equation according to the methodology AM0028 Version 05 and the registered PDD:

$$BE_{period} = \left(\sum_{i}^{n} F_{TI,i} \times CI_{N2O,i} \times M_i \right) \times GWP_{N2O}$$

Where

M_i	Length of Measuring Interval (hr), (1hr)
GWP_{N2O}	Global warming potential of the N_2O, (310: default value).
n	Number of intervals during this period
$F_{TI,i}$	Volume flow rate at the inlet of the DF during interval (Nm^3/hr)
$CI_{N2O,i}$	N_2O concentration in the tail gas of the DF inlet during interval (tN_2O/Nm^3)

The PP monitored the operating conditions parameters including the operating temperature and pressure, and the baseline emissions during the 11 days when the daily average of the operating conditions were out of the permitted range when *the actual operating temperatures of the AORs of Plant I were out of permitted rage*, are recalculated with the default IPCC value, i.e.,

$$BE_{daily,\ out\ of\ permit\ range} = P_{product,\ day} \times EF_{N2O} \times GWP_{N2O} / 1000$$

Where

$BE_{daily,\ out\ of\ permit\ range}$	The daily daseline emission for the respective day in which AOR operation conditions were outside of "permitted range ($tonCO_2$/day)
$P_{product,\ day}$	The daily output of caprolactam for the respective day in which AOR operation conditions were outside of permitted range (ton caprolactam/day)
EF_{N2O}	N_2O Emission factor to the process of caprolactam production (kgN2O/ton caprolactam)

Emission factor of N_2O (EF_{N2O}) is the lowest value among (a) $EF_{N2O,IPCC}$, (b) $SE_{N2O,y}$ and (c) any related value as a result of legal regulation(e.g. $RSE_{N2O,y}$). See the section E.1 of the monitoring report. There is no applicable $RSE_{N2O,y}$ in the host country. Bureau Veritas Certification can conclude that it is reasonable to use the $EF_{N2O,IPCC}$ as the EF_{N2O} since it is the lowest value among the options, and this recalculation procedure complies with the methodology AM0028 Version 05 and the monitoring plan. Since regular complete overhaul was performed during the 11 days (09/10/2011~19/10/2011) when AOR operation conditions of Plant I were outside of

permitted ranges /16/ /17/, the daily caprolactam productions for the respective days were zero. Therefore Bureau Veritas Certification can confirm that each of the daily baseline emission ($BE_{daily,\ out\ of\ permit\ range}$) when AOR operation conditions of Plant I were outside of permitted ranges is estimated as zero.

Bureau Veritas Certification has checked the records of all the monitoring parameters, and can confirm that the monitored values of the parameters included in the emission reductions calculation spreadsheet /5/ and the monitoring report version 4.0 /4/ are consistent with the documented evidences. Bureau Veritas Certification has checked the calculation of the baseline emissions included in the emission reductions calculation spreadsheet, and can confirm that the calculation of the baseline emissions is correct and reasonable, and the BE_{period} = 242,899.40tCO_2e.

[Project emissions]

The emission due to the project activity are composed of (a) the emissions of not destroyed N_2O, (b) on-site emissions due to the hydrocarbons (Natural Gas) use as input to the N_2O destruction facility, and (c) the emissions from the operation of the destruction facility.

Hydrocarbons can be used as reducing agent and/or re-heating the tail gas to enhance the catalytic N_2O reduction efficiency. In this project, natural gas is used for re-heating the tail gas to enhance the catalytic N2O reduction efficiency

$PE_{period} = PE_{ND,period} + PE_{HC,period} = PE_{ND,period} + HCE_{C,period} + HCE_{NC,period} =$

$$(\sum_{i}^{n} F_{TE,i} \times CO_{N2O,i} \times M_i) \times GWP_{N2O}$$

$$+ [(\rho_{HC} \times Q_{HC,y} \times EF_{HC} \times OXID_{HC}/100) + (\rho_{CH4} \times Q_{CH4,y} \times EF_{CH4} \times OXID_{CH4}/100)]$$

$$+ [\rho_{CH4} \times Q_{CH4,y} \times GWP_{CH4} \times (1\text{-}OXID_{CH4}/100)]$$

PE_{period}	: Project emissions (tCO_2e)
PE_{ND}	: Project emissions from N_2O not destroyed (tCO_2e)
$HCE_{C,y}$	: Converted hydrocarbons emissions (tCO_2e)
HCE_{NC}	: Methane emissions (tCO_2e)
n	: Number of intervals during the year ($period^{-1}$)
M_i	: Length of Measuring Interval (hr), (1hr : set value at instrument for this project)
$F_{TE,i}$	: Volume flow rate at the exit of the DF during interval i (Nm^3/hr)
$CO_{N2O,i}$	: N_2O concentration in the tail gas of the DF exit during interval i (tN_2O/m^3)

GWP_{CH4}	: Global warming potential of CH_4, 21 (: default value)
GWP_{N2O}	: Global warming potential of the nitrous oxide, 310 (: default value)
ρ_{CH4}	: Density of methane (tCH_4/m^3) , 0.000716
ρ_{HC}	: Density of HC (tHC/m^3)
EF_{CH4}	: CO_2 emission factor of CH_4 (tCO_2e/tCH_4), 2.75
EF_{HC}	: CO_2 emission factor of HC with two or more carbon molecule in natural gas (tCO_2e/tHC)
$Q_{CH4,y}$	: Methane used in period (Nm^3/period)
$Q_{HC,y}$	: HC with two or more carbon molecule in natural gas used in period (Nm^3/period)
$OXID_{CH4}$	: Oxidation factor of methane (%)
$OXID_{HC}$	: Oxidation factor of HC(%), 100% (Fixed value)

Bureau Veritas Certification has checked the records of the monitoring parameters and can confirm that the monitored values of the parameters included in the emission reductions calculation spreadsheet /5/ and the monitoring report version 4.0 /4/ are consistent with the documented evidences. Bureau Veritas Certification has checked the calculation of the project emissions included in the emission reductions calculation spreadsheet, and can confirm that the calculation of the project emissions is correct and reasonable, and the PE_{period} = 26,361.62tCO_2e.

[Leakage emissions]

As per the registered PDD, heat exchange is conducted in De-N_2O system, and the installation of the N_2O destruction facility does not result in significant additional energy consumption at the caprolactam production plant, and therefore no leakage is expected at this project, and the LE_{period} = 0.

[Emission reductions]

Therefore, the emission reductions during the monitoring period from 01/09/2011 to 31/12/2011 are calculated as:

$ER_{period} = BE_{period} – PE_{period} – LE_{period}$

= 242,899.40 - 26,361.62 - 0

= 216,537 tCO_2e

The emission reductions are recalculated for the periods when special events happened. Bureau Veritas Certification has checked the information and data records /13/ /16/ /17/ /18/ during these periods and can confirm that the information provided in the monitoring report and the emission reductions is consistent with the data records /13/ /16/ /17/ /18/. Bureau can conclude the recalculation method is conservative. The data of the volume flow rate and N_2O concentration at the inlet and outlet of the destruction facility have been excluded from the emission reduction calculation, which is conservative since the N_2O quantity at the outlet cannot be more than the N_2O quantity at the inlet of the destruction facility because of its N_2O destruction function. Natural gas input for re-heating the tail gas (Q_{NG-1}) and CH_4 concentration at destruction facility outlet (CO_{CH4-1}) are included to calculate the project emissions.

[Comparison of ERs]

The monitoring report calculates the daily average emission reductions during this monitoring period. Compared to the expected daily average emission reductions, the actual daily average emission reductions are lower. Hence the emission reductions claimed during this monitoring period are lower than the corresponding estimated emission reductions in the registered PDD /1/.

✌ Corresponding to the paragraph 246 of VVS version 02.0, Bureau Veritas Certification can confirm that:

- Data used for the determination of the emission reductions are available and monitored in accordance with the monitoring plan contained in the registered PDD.
- Information and data provided in the monitoring report have been cross-checked with other sources such as plant logbooks, inventories, purchase records, laboratory analysis.
- Appropriate methods and formulae for calculating baseline emissions, project emissions and leakage have been followed.
- Assumptions, emission factors and default values that were applied in the calculations have been justified.

4. VERIFICATION OPINION

Bureau Veritas Certification has performed the 2nd periodic verification of N2O Abatement Project of Capro Corporation, CDM Registration Reference Number 4665, which is located in Bugok-dong, Nam-gu, Ulsan, the south-eastern part of the Republic of Korea, and applying the methodology AM0028 Version 05. The verification was performed based on the requirements set by the CDM and relevant guidance provided by CMP and the CDM Executive Board.

The verification consisted of the following three phases: i) desk review of the project design, the baseline and monitoring plan; ii) follow-up interviews with project stakeholders; iii) resolution of outstanding issues and the issuance of the final verification report and opinion.

The management of Capro Corporation; Hyosung Ebara Engineering Co., Ltd.; and Hyosung Corporation is responsible for the preparation of the GHG emissions data and the reported GHG emission reductions of the project on the basis set out within the monitoring plan contained in the registered PDD. The development and maintenance of records and reporting procedures in accordance with that plan, including the calculation and determination of GHG emission reductions from the project, is the responsibility of the management of the project.

Bureau Veritas Certification has verified the project Monitoring Report version 4.0 dated 03/12/2012 for the reporting period as indicated below. Bureau Veritas Certification confirms that the project is implemented as described in the validated and registered project design documents. Installed equipments being essential for generating emission reductions run reliably and are calibrated appropriately. The monitoring system is in place and the Project is generating GHG emission reductions as a CDM project.

Bureau Veritas Certification can confirm that the GHG emission reductions are calculated without material misstatements. Our opinion relates to the projects' GHG emissions and resulting GHG emission reductions reported and related to the validated and registered project baseline, monitoring plan and its associated documents. Based on the evidence and information that are considered necessary to guarantee that GHG emission reductions are appropriately calculated, Bureau Veritas Certification confirms the following statement:

Reporting period:	01/09/2011 to 31/12/2011	
Baseline emissions:	242,899.40	t CO_2 equivalents
Project emissions:	26,361.62	t CO_2 equivalents
Leakage emissions:	0	t CO_2 equivalents
Emission Reductions:	216,537	t CO_2 equivalents

Ms. (Coco) Geng Yan
Internal Technical Reviewer
18/12/2012

Mr. (Ernesto) Tan Wenbin
Team Leader
18/12/2012

5. REFERENCES

Documents reviewed:

/1/ Registered PDD version 8.1 dated 24/05/2011, UNFCCC ref no.4665

/2/ Validation Report revision 4.1, dated 01/06/2011

/3/ Monitoring Report Version 3.0 dated 15/10/2012

/4/ Monitoring Report Version 4.0, dated 03/12/2012

/5/ Emission Reductions Calculation Spreadsheet

/6/ Monitoring Report Version 3.0 dated 25/09/2012 and Verification Report Version 02 dated 27/09/2012 for the 1st (previous) periodic verification

/7/ AM0028 Version 05

/8/ Validation and Verification Standard Version 02.0 dated 25/11/2011

/9/ Record of construction start dated on 16/11/2010

/10/ Record of commissioning start of Plant 1 dated 20/04/2011

/11/ Record of commissioning start of Plant 2 dated 27/04/2011

/12/ Record of completing construction of N2O abatement system dated 02/05/2011

/13/ Data records stored in the EEU and HDD

/14/ Supplier information on catalyst delivery confirmation document

/15/ Statement on the Volumetric Expansion Factor (VEF) by CRI Catalyst Company dated 05/2011

/16/ Process shutdown log

/17/ Production Log

/18/ AMS records

/19/ European Norm EN 14181:2004 Stationary source emissions - Quality assurance of automated measuring systems

/20/ Air quality - Evaluation of the suitability of a measurement procedure by comparison with a required measurement uncertainty (ISO 14956:2002)

/21/ QAL 1 records of the AMS monitoring equipments

/22/ Reports of QAL2 tests conducted from 23/05/2011 to 27/05/2011 and from 26/09/2011 to 29/09/2011 for the AMS installed for the Plant 1 and Plant 2, issued by AIRTEC

/23/ QLA3 zero/span test records

/24/ Calibration records of the monitoring equipments

/25/ Replacement record of the measuring instrument for $T_{g\text{-}b}$, tag number TI-1206, dated 17/10/2011

/26/ Accreditation certificates of the calibration organizations

/27/ Test report of the D-EMS 2000 System dated 07/2011

/28/ CDM Monitoring & Management Manual

/29/ CDM and monitoring internal training records

Persons interviewed:

Capro Corporation
Mr. Lee, Hyun-Woo
Mr. Lee, Myung-Jin
Mr. Bae, Han-Seong
Mr. Choi, Cheong-Jeong
Mr. Choi, Jong-Hee
Mr. Bae, Ik-Jin
Mr. Heo, Gyu-Ho

Hyosung Ebara Engineering Co., Ltd.
Mr. Park, Jong-Hoon
Ms. Lee, Hyun-Jung

Hyosung Corporation

Mr. Choi, Yung-Yul

6. CURRICULA VITAE OF THE DOE'S VERIFICATION TEAM MEMBERS

Mr. (Ernesto) Tan Wenbin	Bureau Veritas Certification, China	Team Leader, Climate Change Lead Verifier. He holds a bachelor degree in Geology and a master degree in Structural Geology. Before joining BV, he gained more than 2 years' technical experience in Petroleum Exploitation and Storage & Transportation sector, and more than 3 year's technical experiences in coal mining sector in P.R China. He obtained the certificate of CDM Lead Verifier and Lead Auditor for ISO 14001.
Mr. (Jony) Li Qing	Technical Specialist Bureau Veritas Certification, China	He holds a Bachelor Degree in chemical engineering and technology. Before joining BV in 2011, he had about one year experience of chemical plant director, two years' experience of chemical plant flue gas analysis, and more than three years' experience of chemical plant corrosion monitoring. He obtained the certificate of CDM Verifier, Lead Auditor for ISO 14001.
Ms. (Coco) Geng Yan	Bureau Veritas Certification, China	Internal Reviewer, Climate Change Lead Verifier. She holds a Master Degree in Ecology and a bachelor degree in Forestry. She has 2 years of experience in CDM in P.R China. She obtained the certificate of CDM Verifier in 2010, Lead Auditor for ISO 14001 and has successfully completed the course assessment for ISO 14064.

Ms. An Baifang	Technical Specialist Bureau Bosun Safety Technology Co.,Ltd.	She holds a bachelor degree in Chemical Mechanic. She gained 8 years directly experience in operation and inspection Chemical Processing. She is a Certified Supervision Engineer and she possesses professional qualification of UT-2, MT-2, PT-2, Pressure vessel Inspector, ISO 9000 Internal Auditor and OHSAS 18001 Internal Auditor. She was involved in 20 plus chemical engineering including Hydrocracking Installation, Gasoline Refining Installation, Ethylene Installation, Synthetic Ammonia Installation, ARGG Installation, Sulfur Recovery Installation and Polypropylene Installation in China since 2006.

APPENDIX A: CDM PROJECT VERIFICATION PROTOCOL

Table 1 Verification requirements based on the Clean Development Mechanism Validation and Verification Standard (Version 02.0)

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
1 Compliance of the project implementation with the registered project design document					
1.a Has the implementation and operation of the project activity been conducted in accordance with the description contained in the registered PDD?	VVS	226	The implementation and operation of the project activity "N2O Abatement Project of Capro Corporation" have been conducted in accordance with the description contained in the registered PDD. The project participant Capro Corporation; Hyosung Ebara Engineering Co., Ltd.; and Hyosung Corporation Has operated the Project as per the registered PDD. The tertiary N_2O abatement catalyst technology is applied and N_2O emissions were reduced. Caprolactam is produced by cyclohexane, ammonia, and sulphur as its primary raw materials. Within the Caprolactam production process, ammonia is oxidized in AOR to generate NO and NO_2, which are going to be the reactants for Ammonium nitrite. Nitrous oxide (N2O) is generated as an undesired by-product through the	~~CAR 1~~	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
			side reaction of Ammonia oxidation as follows: $4NH_3 + 5O_2 \rightarrow 4NO + 6H_2O$ (Main reaction) $2NO + O_2 \rightarrow 2NO_2$ (Desired in the NO oxidation process) $4NH_3 + 3O_2 \rightarrow 2N_2 + 6H_2O$ (Side reaction) $4NH_3 + 4O_2 \rightarrow 2N_2O + 6H_2O$ (Side reaction) De-N_2O system for this project is to destruct the N_2O included in tail gas by catalyst without any reducing agent. $2N_2O \rightarrow 2N_2 + O_2$ The catalytic reactor designed by Hyosung Ebara Engineering Co., Ltd. was derived from RTO (Regenerative Thermal Oxidizer), to save the energy required for catalytic reaction to decompose N2O, and this N2O destruction facility is the so-called “Regenerative Catalytic System”. Where, liquefied natural gas (LNG, hereafter “natural gas”) is put in to this system as a fuel, not reducing agent, to supply the energy required for the de-N2O catalytic reaction. Catalyst is provided by CRI. Section B.1 of the monitoring report provides the information regarding the actual operation of the		

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
			project activity, including the operation information of the AORs, Ammonia Oxidation Catalyst, and Plant output of Caprolactam. ~~CAR-1 Please revise the ending time of the Event No.6 of the Plant II as per the documented evidence.~~ Bureau Veritas Certification can confirm that the revised Event No.6 of the Plant II is consistent with the documented evidence, Process shutdown log /16/. This CL is closed.		
1.b Are all physical features of the project activity in the registered PDD in place?	VVS	227	Yes. Bureau Veritas Certification has checked on-site and through documents review and confirm that all the physical features of the proposed CDM project activity proposed in the registered PDD are in place. De-N_2O system for this project is to destruct the N_2O included in tail gas by catalyst without any reducing agent. $2N_2O \rightarrow 2N_2 + O_2$ The catalytic reactor designed by Hyosung Ebara	OK	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
			Engineering Co., Ltd. was derived from RTO (Regenerative Thermal Oxidizer), to save the energy required for catalytic reaction to decompose N2O, and this N2O destruction facility is the so-called “Regenerative Catalytic System”. Where, liquefied natural gas (LNG, hereafter “natural gas”) is put in to this system as a fuel, not reducing agent, to supply the energy required for the de-N2O catalytic reaction. Catalyst is provided by CRI. The monitoring system and monitoring equipments complies with the requirements in the registered PDD.		
1.c Have the project participants operated the project activity as per the registered PDD or any approved revised PDD?	VVS	227	Yes. The project participant Capro Corporation; Hyosung Ebara Engineering Co., Ltd.; and Hyosung Corporation operated the project activity as per the registered PDD.	OK	OK
1.d Was an on-site visit conducted?	VVS	227	Yes. The on-site visit of this verification has been conducted on 21/11/2012 by (Ernesto) Tan Wenbin, climate change lead verifier of Bureau Veritas Certification (China), and Mr. (Jony) Li Qing, climate change specialist of Bureau Veritas	OK	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
			Certification (China). The audit purpose and methodology were briefed in the opening meeting participated by the following persons. Capro Corporation Mr. Lee, Hyun-Woo Mr. Lee, Myung-Jin Mr. Bae, Han-Seong Mr. Choi, Cheong-Jeong Mr. Choi, Jong-Hee Mr. Bae, Ik-Jin Mr. Heo, Gyu-Ho Hyosung Ebara Engineering Co., Ltd. Mr. Park, Jong-Hoon Ms. Lee, Hyun-Jung Hyosung Corporation Mr. Choi, Yung-Yul		
1.e If not, justify the rationale of the decision.	VVS	227	N/A	OK	OK
2 Compliance of the monitoring plan with the monitoring methodology including applicable tool(s)					

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
2.a Is the monitoring plan of the project activity in accordance with the applied methodology including applicable tool(s)?	VVS	229	Yes. The registered Monitoring Plan (MP) in accordance with the methodology AM0028 Version 05 has been applied by the CDM project activity. The monitoring organization has been set up and in functions. All monitoring staffs have been trained and the training records have been provided and verified. The monitoring procedures are in place and function. All parameters indicated in the MP have been measured and recorded in the respective documents. The QA/QC procedures are in place and function.	OK	OK
2.b Is the project implementation in accordance with the provisions of the registered PDD and/or an approved revised PDD?	VVS	230	Yes. The project implementation is in accordance with the provisions of the registered PDD.	OK	OK
3 Compliance of monitoring activities with the registered monitoring plan					
3.a Have the monitoring of parameters related to the GHG emissions reductions in the project activity been implemented in accordance with the monitoring plan contained in the registered PDD or any accepted revised monitoring plan?	VVS	233	Yes. The monitoring of the following parameter related to the GHG emissions reductions in the project activity have been implemented in accordance with the monitoring plan.	OK	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
3.b Has the monitoring plan been properly implemented and followed by the project participants?	VVS	234	Yes. The monitoring plan has been properly implemented and followed by the project participant.	OK	OK
3.c Have all parameters stated in the monitoring plan and relevant Board decisions been monitored and updated as applicable, including:	VVS	234			
3.c.i Project emission parameters?	VVS	234	Yes. All the parameters, for project emission calculation are included and sufficiently monitored and updated.	OK	OK
3.c.ii Baseline emission parameters?	VVS	234	Yes. All the parameters for baseline emission calculation are included and sufficiently monitored and updated.	OK	OK
3.c.iii Leakage parameters?	VVS	234	According to the registered PDD and the methodology AM0028 Version 05, no leakage calculation is required.	OK	OK
3.c.iv Management and operational system: the responsibilities and authorities for monitoring and reporting are in accordance with the	VVS	234	Yes. The management and operational system including	OK	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
responsibilities and authorities stated in the monitoring plan?			the responsibilities and authorities for monitoring and reporting, specified in the Section C of the monitoring report, are in accordance with the responsibilities and authorities stated in the monitoring plan.		
3.d Is the equipment used for monitoring in accordance with section 4. "Compliance with the calibration frequency requirements for measuring instruments" in the VVS and is controlled and calibrated in accordance with the monitoring plan, the applied methodology, the Board guidance, local/national standards, or as per the manufacturer.s specification?	VVS	234	Yes. The equipments used for monitoring are in compliance with the calibration frequency required by the monitoring plan, and is controlled and calibrated in accordance with the monitoring plan, the applied methodology, the Board guidance, local/national standards, or as per the manufacturer's specification.	OK	OK
3.e Are monitoring results consistently recorded as per approved frequency?	VVS	234	Yes.	OK	OK
3.f Have quality assurance and quality control procedures been applied in accordance with the monitoring plan or the revised monitoring plan?	VVS	234	Yes. The QA/QC procedures have been documented in the Monitoring and Management Manual and have been applied in accordance with the monitoring plan.	OK	OK
4 Compliance with calibration frequency requirements for measuring instruments					
4.a Is the calibration of those measuring equipments that	VVS	237	~~CL-1 Please include information of the monitoring~~	~~CL-1~~	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
have an impact on the claimed emission reductions conducted by the project participants at a frequency specified in the applied monitoring methodology and/or the monitoring plan?			~~equipment replacement in the section D.2 of the monitoring report as well as the required information of the equipment before replacement.~~ Bureau Vertias Certification has checked the Replacement record of the measuring instrument for T_{g-b}, tag number TI-1206, dated 17/10/2011 /25/ and the Calibration records of the monitoring equipments /24/ and can confirm that the monitoring equipment replacement information is correct. This CAR is closed.		
4.b During verification of a certain monitoring period, has the calibration been delayed and has the calibration has been implemented after the monitoring period in consideration (i.e. the results of delayed calibration are available)?	VVS	238	No.	OK	OK
4.c If yes, is the following conservative approach adopted in the calculation of emission reductions?	VVS	238	N/A.	OK	OK
4.c.i Applying the maximum permissible error of the instrument to the measured values taken during the period between the scheduled date of calibration and the actual date of calibration, if the results of the delayed calibration do not show	VVS	238	N/A.	OK	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
any errors in the measuring equipment, or if the error is smaller than the maximum permissible error; or					
4.c.ii Applying the error identified in the delayed calibration test, if the error is beyond the maximum permissible error of the measuring equipment.	VVS	238	N/A.	OK	OK
4.d Has the error has been applied:	VVS	239	N/A.	OK	OK
4.d.i In a conservative manner, such that the adjusted measured values of the delayed calibration shall result in fewer claimed emission reductions?	VVS	239	N/A.	OK	OK
i Applying the error identified in the delayed calibration test, if the error is beyond the maximum permissible error of the measuring equipment.	VVS	239	N/A.	OK	OK
4.e In cases where the results of the delayed calibration are not available, or the calibration has not been conducted at the time of verification, prior to finalizing verification, were the project participants requested to conduct the required calibration have the project participants calculated the emission reductions conservatively using the approach mentioned in item “c” above?	VVS	240	N/A.	OK	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
4.f Is it possible for the project participants to conduct the calibration at a frequency specified by either the applied methodology, guidance provided by the Board, and/or the registered monitoring plan?	VVS	241	Yes.	OK	OK
4.g If no, were the requirements for post registration changes, in section of E of the VVS, followed?	VVS	241	N/A.	OK	OK
4.h Do the monitoring methodology or the monitoring plan specify any requirements for calibration frequency for measuring equipments?	VVS	242	Yes. The calibration frequency for the measuring equipments complies with the requirements in the monitoring plan.	OK	OK
4.i If no, are the equipments calibrated either in accordance with the specifications of the local/national standards, or as per the manufacturer's specification?.	VVS	242	N/A.	OK	OK
4.j If neither local/national standards nor the manufacturer's specification are available, were international standards used?	VVS	242	N/A.	OK	OK
5 Assessment of data and calculation of emission reductions					
5.a Were the data and calculations of GHG emission reductions achieved by/resulting from the project activity by the application of the selected approved methodology assessed?	VVS	244	Yes.	OK	OK
5.b Is a complete set of data for the specified monitoring	VVS	245		OK	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
period is available? (If only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, the DOE shall either raise a CAR for the project participants to comply with the requirements of appendix 1 of the Project standard or submit a request for deviation prior to submitting request for issuance, if appropriate).			A complete set of data including monitoring results and QA/QC records which can cover the monitoring period has been provided to Bureau Veritas Certification.		
5.c Has information provided in the monitoring report been cross-checked with other sources such as plant log books, inventories, purchase records, laboratory analysis?	VVS	245	Yes. The information provided in the monitoring report has been cross-checked with plant log books and l inventories, etc.	OK	OK
5.d Have calculations of baseline emissions, and project activity emissions and leakage, as appropriate, been carried out in accordance with the formulae and methods described in the monitoring plan and the applied methodology document?	VVS	245	Yes. As per methodology AM0028 Version 05, no leakage calculation is required. The baseline emissions are determined by the following formula as per the methodology: $BE_{period} = \left(\sum_{i}^{n} F_{TI,i} \times CI_{N2O,i} \times M_i \right) \times GWP_{N2O}$ The project emissions are determined by the following formula as per the methodology:	OK	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
			$PE = \left(\sum_i^n F_{TE,i} \times CO_{N2O,i} \times M_i \right) \times GWP_{N2O}$ $+ \left[\begin{array}{l} \left(\rho_{HC} \times Q_{HC,y} \times EF_{HC} \times OXID_{HC} / 100 \right) \\ + \left(\rho_{CH4} \times Q_{CH4,y} \times EF_{CH4} \times OXID_{CH4} / 100 \right) \end{array} \right]$ $+ \left[\rho_{CH4} \times Q_{CH4,y} \times GWP_{CH4} \times \left(1 - OXID_{CH4} / 100 \right) \right]$ The leakage $LE_{perid} = 0$ Emission reductions are being determined using the formula as given in the Section B.6.3 of the PDD. $ER_{period} = BE_{period} - PE_{period} - LE_{period}$		
5.e Have any assumptions used in emission calculations been justified?	VVS	245	N/A as no assumption is used.	OK	OK
5.f Have appropriate emission factors, IPCC default values and other reference values been correctly applied?	VVS	245	Yes.	OK	OK

Table 2 Resolution of Corrective Action / Forward Action / Clarification Requests.

Draft report clarifications and corrective action requests by verification team	Reference to checklist question in Periodic Verification Checklist	Summary of project participant response	Verification team conclusion
CAR-1 Please revise the ending time of the Event No.6 of the Plant II as per the documented evidence.	1.a	The ending time of the Event No.6 of the Plant II is revised to be consistent with the documented evidence, Process shutdown log /16/. Please refer to the revised monitoring report version 4.0.	Bureau Veritas Certification can confirm that the revised Event No.6 of the Plant II is consistent with the documented evidence, Process shutdown log /16/. This CAR is closed.
CL-1 Please include information of the monitoring equipment replacement in the section D.2 of the monitoring report as well as the required information of the equipment before replacement.	4.a	The date of replacement and information of the monitoring equipment before replacement and after replacement are included in the section D.2 of the revised monitoring report version 4.0.	Bureau Vertias Certification has checked the Replacement record of the measuring instrument for *Tg-b*, tag number TI-1206, dated 17/10/2011 /25/ and the Calibration records of the monitoring equipments /24/ and can confirm that the monitoring equipment replacement information is correct. This CL is closed.