



Verification and certification report form for CDM project activities

(Version 01.0)

Complete this form in accordance with the "Attachment: Instructions for filling out the verification and certification report form for CDM project activities" at the end of this form.

VERIFICATION AND CERTIFICATION REPORT

Title of the project activity	Reduction of N ₂ O emissions from the new nitric acid plant #5 of Hu-Chems Fine Chemical Corp.
Reference number of the project activity	6637
Version number of the verification and certification report	Version 1
Completion date of the verification and certification report	14/06/2016
Monitoring period number and duration of this monitoring period	<ul style="list-style-type: none"> Monitoring period number: 4 Duration: 01/09/2015 ~ 31/03/2016
Version number of monitoring report to which this report applies	Version 1.1
Crediting period of the project activity corresponding to this monitoring period	25/02/2013 ~ 24/02/2023 (Fixed, 10 years)
Project participant(s)	<ul style="list-style-type: none"> Carbon CDM Korea Ltd. Hu-Chems Fine Chemical Corp. Carbon Climate Protection GmbH
Host Party	Republic of Korea
Sectoral scope(s), selected methodology(ies), and where applicable, selected standardized baseline(s)	<ul style="list-style-type: none"> Sectoral scope: 5-Chemical industries Selected methodology: ACM0019 Version 01 (N₂O abatement from nitric acid production) No standardized baseline(s) applicable
Estimated GHG emission reductions or net anthropogenic GHG removals for this monitoring period in the registered PDD	<ul style="list-style-type: none"> Amount estimated in PDD for 2015: 384,891 tCO₂e Amount estimated in PDD for 2016: 360,293 tCO₂e → Corresponding estimated amount for the duration of monitoring period (213 days): 218,230 tCO₂e
Certified GHG emission reductions or net anthropogenic GHG removals for this monitoring period	235,599 tCO ₂ e
Name of DOE	Korean Foundation for Quality (KFQ)
Name, position and signature of the approver of the verification and certification report	<div> <div>Soon Hong YEOM</div> <div>Managing Director of Sustainability management institute</div> </div> 

SECTION A. Executive summary

CARBON Climate Protection GmbH has commissioned Korean Foundation for Quality (KFQ) to carry out the verification and certification of emission reductions reported for the “Reduction of N₂O emissions from the new nitric acid plant #5 of Hu-Chems Fine Chemical Corp.” in the Republic of Korea (the project) in the period 01/09/2015 to 31/03/2016. This report contains the findings from the verification and a certification statement for the certified emission reductions.

Verification objective

Verification is the periodic, thorough and independent assessment and ex post determination by a Designated Operational Entity (DOE) of the monitored reductions in GHG emissions that have occurred as a result of the registered CDM project activity during a defined monitoring period. Certification is the written assurance by a DOE that, during a specific period in time, a project activity achieved the emission reductions as verified.

The objective of this verification was to verify and certify emission reductions reported for the “Reduction of N₂O emissions from the new nitric acid plant #5 of Hu-Chems Fine Chemical Corp.” for the period in accordance with paragraph 62 of CDM modalities and procedures.

Verification scope

The scope of the verification is to verify that:

- The project activity has been implemented and operated in accordance with 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.
- 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 and verifiable and in accordance with applicable CDM requirements.
- The monitoring plan complies with the monitoring methodology and the actual monitoring systems and procedures comply with the monitoring systems and procedures described in the monitoring plan and the approved methodology including applicable tools and compliance with any guidance provided by the Board regarding deviations from the provisions of a registered plan and/or methodology.
- Data is recorded and stored as per the monitoring methodology ACM0019 (version 01) and the calculation of GHG emission reductions have been assessed to correctly support the emission reductions being claimed.

Furthermore, it was KFQ's objective to identify any concerns related to the conformity of the actual project activity and its operation with the registered project design document and determine whether any deviation or proposed or actual changes in the implementation or operation of the project activity comply with the requirements of the Project Standard.

The verification shall ensure that reported emission reductions are complete and accurate in order to be certified. The verification is incorporating both quantitative and qualitative information on emission reductions.

Verification process

KFQ has made publicly available the MR received from the PPs. Only verification activities after the publication of the MR on the UNFCCC CDM website have been used as a basis for conclusion of verification.

The verification process includes desk review of the MR published (and any updated versions, if available), emission reduction calculation spreadsheets and other supporting documents and data. Further, onsite assessments and interviews with those involved in project management and operations are conducted. This is followed by preparation of draft verification report summarizing desk review and on-site assessment findings (i.e. CARs, CLs, and FARs). Upon successful closing

of the CARs and CLs raised (if any), the final verification report is prepared. The final report then undergoes a technical review and final approval according to KFQ's internal quality assurance procedures.

The data presented in the MR were assessed by review of the detailed project documentation and production records, as well as by interviews with personnel at Hu-Chems, CARBON CDM Korea Ltd. and Carbon Climate Protection GmbH, and observation of collection of measurements, observation of established monitoring and reporting practices and assessment of the reliability of monitoring equipment. This has enabled the verification team to assess the accuracy and completeness of reported monitoring results, as well as to verify the correct application of the approved monitoring methodology. Furthermore, this has enabled the verification team to assess and determine that the implementation and operation of the project activity as well as the steps taken to report emission reductions in compliance with the CDM criteria and relevant guidance provided by the Board.

In addition, all parameters, as required (and as applicable) by the monitoring methodology ACM0019 (version 01) as well as the monitoring plan and the management system were assessed during the site visit.

Description of the project activity

Project Parties:	Republic of Korea (Host) Austria
Title of project activity:	Reduction of N ₂ O emissions from the new nitric acid plant #5 of Hu-Chems Fine Chemical Corp.
UNFCCC Registration Number:	6637
Project Participants:	<ul style="list-style-type: none"> Carbon CDM Korea Ltd. (Korea) Hu-Chems Fine Chemical Corp. (Korea) Carbon Climate Protection GmbH (Austria)
Baseline and monitoring methodology:	ACM0019 (Version 01)
Location of the project activity:	Address Yeosu, 7-6, Wollae-dong, Jeollanam-do, Republic of Korea
	GPS Coordinates: Longitude: 127.74158E // Latitude: 34.84583N
Registered PDD:	Version 1.4 of 22/06/2012
Validation:	Validation report of 03/07/2012 by TÜV SÜD
Registration Date:	17/07/2012
Crediting Period:	25/02/2013 to 24/02/2023 (changed from 01/09/2012 to 31/08/2022)
Period verified in this verification:	01/09/2015 to 31/03/2016

The project has installed tertiary N₂O reduction technology in the tail gas stream of the #5 nitric acid production plant of Hu-Chems Fine Chemicals Corp. (hereafter called "Hu-Chems") in Yeosu, Korea. Nitrous oxide, formed as a by-product of the nitric acid production, is removed by an EnviNOx® System provided by UHDE GmbH.

The EnviNOx® process used in the #5 nitric acid plant is based on the catalytic decomposition of nitrous oxide (N₂O) and the catalytic reduction of NO_x (NO and NO₂) with ammonia (NH₃). The reactions take place over two iron zeolite catalyst beds.

The tail gas from the nitric acid facility is fed into EnviNOx® System, and according to the ex-ante emission reductions in the registered PDD, the N₂O is reduced by approximately 96%. The tail gas

volume flow and the N₂O concentration at the outlet of the EnviNOx® System are monitored and recorded.

Conclusion

KFQ has performed the verification of the emission reductions reported for the project activity “Reduction of N₂O emissions from the new nitric acid plant #5 of Hu-Chems Fine Chemical Corp.” in Korea (UNFCCC Registration Ref. No. 6637) for the period 01/09/2015 to 31/03/2016.

The verification of the emission reductions has assessed all factors and issues that constitute the basis for emission reductions from the project. All relevant records of data from the EnviNOx® System and records from the production logs of the nitric acid production have been examined and verified for the reporting period.

The verification team has during its preparations identified the key reporting risks and used the assessment to determine to which extent the project operator’s control systems were adequate for mitigation of these key reporting risks. In addition, other areas that can have an impact on reported emission reductions have also undergone detailed audit testing.

KFQ also confirms that the GHG emission reductions are calculated without material misstatements. Our opinion refers to the project’s GHG emissions and resulting GHG emission reductions reported, both determined using the valid and registered project’s baseline, its monitoring plan and its associated documents.

The implementation of the project resulted in 235,599 tCO₂e of emission reductions during the period from 01/09/2015 to 31/03/2016 which is within the fixed crediting period from 25/02/2013 to 24/02/2023. In our opinion, the GHG emission reductions reported for the project in the MR (Version 1.1) are fairly stated. The GHG emission reductions were calculated correctly on the basis of the approved monitoring methodology ACM0019 (version 01) and the monitoring plan contained in the PDD (version 1.4 dated 22/06/2012).

KFQ is able to certify that the emission reductions from the “Reduction of N₂O emissions from the new nitric acid plant #5 of Hu-Chems Fine Chemical Corp.” in Korea during the period from 01/09/2015 to 31/03/2016 amount to 235,599 tonnes of CO₂e.

SECTION B. Verification team, technical reviewer and approver**B.1. Verification team member**

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)	Involvement in			
						Desk review	On-site inspection	Interview(s)	Verification findings
1	Team Leader	IR	CHO	Jin Seok	KFQ	√	√	√	√
2	Verifier(*)	IR	YOON	Sung Han	KFQ	√	-	-	√
3	Verifier(*)	IR	JEONG	Yu Shim	KFQ	√	√	√	√

(*) means a personnel with technical expertise in technical area 5.2

B.2. Technical reviewer and approver of the verification and certification report

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)
1	Technical reviewer	IR	PARK	Sang Yeon	KFQ
2	Approver	IR	YEOM	Soon Hong	KFQ

Please refer to Appendix 2 below for demonstration of how the team meets the competence required for the verification.

SECTION C. Application of materiality**C.1. Consideration of materiality in planning the verification**

No.	Risk that could lead to material errors, omissions or misstatements	Assessment of the risk		Response to the risk in the verification plan and/or sampling plan
		Risk level	Justification	
1	Number of Monitoring parameters	L	Methodology and tool require a rather low number of monitoring parameters	In response of that risk, the KFQ verification team nevertheless included three verifiers in total and two of them on-site in order to cover/review all monitoring parameters in a complete and detailed manner.
2	Error rate in Monitoring report	L	Expert organization is involved in compilation of MR as well as calculation	In response of that risk, the KFQ verification team focused on systematic consistency and error checks
3	Familiarity with Monitoring	L	This is 4 th monitoring period.	In response to that risk, the

	<i>system</i>		<i>Expert organization is involved in the periodic inspection of monitoring equipment</i>	<i>KFQ verification team checked the existence of any and all monitoring instruments as well as their valid calibration, independently from the fact that the PPs would be familiar with the monitoring system.</i>
4	QA/QC	L	<i>Stable QA/QC system has been implemented and integrated into existing QMS</i>	<i>In response to that risk, the KFQ verification team focused on periodic calibration and QA/QC activities performed as per EN 14181 as well as on plausibility check in order to ensure data quality.</i>
5	Data flow	L	<i>Transferred to the spreadsheet automatically</i>	<i>In response to that risk, the KFQ verification team checked the safeguard measures for raw data and crosschecked raw data with the MS Excel spreadsheets on a random sampling basis, in an extent to ensure the functioning of the transferring system.</i>
6	Recalculation	M	<i>Calculation is performed in excel spreadsheet applying formulae. However, recalculation is done manually.</i>	<i>In response to that risk, the KFQ verification team firstly checked on the existence of omissions of events for recalculations and secondly reviewed all recalculations in detail.</i>

KFQ's verification plan draws on an understanding of the risks associated with reporting of GHG emission data and the controls in place to mitigate these. KFQ planned the verification by obtaining evidence and other information and explanations that KFQ considers necessary to give reasonable assurance on the reported GHG emission reductions on the basis of risk level identified and materiality concept in accordance with "Guideline on application of materiality in verifications" (ver. 02).

C.2. Consideration of materiality in conducting the verification

Detected findings do not impact the amount of emission reductions and are thus immaterial. As these findings could be considered as simple error, not systematic reoccurring error, the verification team decided that no additional audit procedures need to be conducted in order to reach a reasonable level of assurance, and that the claimed emission reductions in the MR are free from material error, omission or misstatement. Accordingly, verification and sampling plan were not revised.

SECTION D. Means of verification

D.1. Desk review

>>

KFQ's verification is based on the monitoring documentation provided by the PP especially the MR, (Version 1 dated 13/04/2016 (published on 14/04/2016) and Version 1.1 dated 31/05/2016) and the CDM Project spreadsheets. Furthermore, the registered PDD and validation report were reviewed as well as the monitoring plan, previous verification reports, the applied baseline and monitoring methodology and any other information and references relevant to the project activity's emission reductions (e.g. IPCC reports, etc.). A complete list of all documents reviewed is shown in Appendix 3 of this verification report. KFQ's verification process takes into consideration all the CDM Rules and Guidances applicable to the project activity, e.g. Clean Development Mechanism Validation and Verification Standard, Clean Development Mechanism Project Standard, Clean Development Mechanism Project Cycle Procedure, Post Registration Changes and Request for Issuance: Completeness checklist, Post Registration Changes and Request for Issuance: Information and reporting checklist and relevant decisions, clarifications and guidance from the CMP and the CDM EB.

During the desk review, KFQ has applied standard auditing techniques to assess the quality of information provided. The following activities were performed:

- Verify the compliance of the MR with the guidance for completing the monitoring report form;
- Verify the completeness of the data and the information presented;
- Review the monitoring plan contained in the registered PDD and monitoring methodology. Check the compliance of the MR with respect to the monitoring plan and verify that the applied methodology was carried out. Particular attention to coverage of all monitoring parameters, the frequency of measurements, the quality of the metering equipment including calibration requirements and the quality assurance and quality control procedures was paid;
- Review the calculations and assumptions used to obtain GHG data and ER
- Evaluate the data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions.

D.2. On-site inspection

Detailed verification of all data contained in the MR was performed during the site visit at Hu-Chems Fine Chemicals Corp. on 11/05/2016. During the site visit, the personnel were interviewed or assisted the verification team. During the on-site assessment, KFQ has applied standard auditing techniques to assess the quality of information provided. The following aspects of the CDM project activity have been confirmed:

- The implementation and operation of the CDM project activity;
- The information flow for generating, aggregating, recording, calculation and reporting of the monitoring parameters; and
- The operational and data collection procedures and their implementation in accordance with the monitoring plan.

Further, the following activities were performed:

- A cross-check between information provided in the MR and data from other sources such as plant log books, inventories, purchase records or similar data sources;
- A check of the monitoring equipment including calibration performance and observations of monitoring practices against the requirements of the PDD, the monitoring plan and ACM0019 (Version 01);
- A review of calculations and assumptions made in determining the GHG data and emission reductions; and

- An identification that quality control and quality assurance procedures are in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.

Duration of on-site inspection: 11/05/2016				
No.	Activity performed on-site	Site location	Date	Team member
1	Confirmation of the correct & complete implementation and operation of the Project Activity and check of all physical features as described in the PDD are in place.	Yeosu	11/05/2016	Jin Seok CHO Yu Shim JEONG
2	Review of the complete data flow from data generation, aggregation, recording, calculation to reporting of the monitoring parameters.	Yeosu	11/05/2016	Jin Seok CHO Yu Shim JEONG
3	Confirmation of the complete & correct implementation of procedures for the operation and data collection.	Yeosu	11/05/2016	Jin Seok CHO Yu Shim JEONG
4	Verification of the information provided in the MR and documentation with other sources.	Yeosu	11/05/2016	Jin Seok CHO Yu Shim JEONG
5	Check of the monitoring equipment against the PDD, the monitoring plan as well as the approved methodology, including check of calibration & maintenance, etc. in relation to that equipment.	Yeosu	11/05/2016	Jin Seok CHO Yu Shim JEONG
6	Identification whether suitable QA/QC procedures are in place in order to prevent errors or to enable the corrections of errors and omissions in the reported parameters.	Yeosu	11/05/2016	Jin Seok CHO Yu Shim JEONG

D.3. Interviews

A list of the persons interviewed during this verification activity is included in the table below.

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1	HAN	DuHee	Hu-Chems Fine Chemicals Corp	11/05/2016	General support	Jin Seok CHO Yu Shim JEONG
2	Baek	Jongmin	Same as above	11/05/2016	General support, maintenance	Jin Seok CHO Yu Shim JEONG
3	LEE	Seunghun	Same as above	11/05/2016	Production, documentation	Jin Seok CHO Yu Shim JEONG
4	KIM	Kyunghoon	Same as above	11/05/2016	Overseas Sales & Marketing	Jin Seok CHO Yu Shim JEONG
5	KIM	DongHyun	Carbon CDM Korea	11/05/2016	CDM coordination	Jin Seok CHO Yu Shim JEONG
6	Bichler	Sonja	Carbon Climate Protection GmbH	11/05/2016	QA/QC, Calculation, Reporting	Jin Seok CHO Yu Shim JEONG
7	Dunkel-Schwarzenberger	Gerald	Carbon Climate Protection GmbH	11/05/2016	General support	Jin Seok CHO Yu Shim JEONG

D.4. Sampling approach

As per the requirements set out in VVS (Version 9.0), random sampling has been applied, as relevant for the present case in the Project Activity, where no sampling approach was applied by the PP.

Since automatic transferred system to the spreadsheet is in place, Crosscheck for data in spreadsheet against raw data were done based on random sampling after confirming safeguard measure for raw data in DCS and server and transferring system. Sampling plan when the verification team planned for verification has been revised as some minor omissions in the detection process of events related to emission reductions were found.

Whereas recalculations for all events, the locations, calibrations of all measurement instruments and intervals (Measuring frequency, Reading frequency and Recording frequency) were assessed.

D.5. Clarification requests, corrective action requests and forward action requests raised

Areas of verification findings	No. of CL	No. of CAR	No. of FAR
Compliance of the monitoring report with the monitoring report form	0	0	0
Compliance of the project implementation with the registered PDD	1	0	0
Post-registration changes	0	0	0
Compliance of the monitoring plan with the monitoring methodology including applicable tool and standardized baseline	0	0	0
Compliance of monitoring activities with the registered monitoring plan	0	0	0
Compliance with the calibration frequency requirements for measuring instruments	1	0	0
Assessment of data and calculation of emission reductions or net removals	0	0	0
Others (please specify)	0	0	0
Total	2	0	0

The objective of this phase of the verification was to resolve any issues which needed to be clarified prior to KFQ's conclusion that i) the project activity has been implemented and operated in accordance with the registered PDD or any approved revised PDD, ii) the monitoring plan complies with the monitoring methodology and the actual monitoring complies with the monitoring plan including any guidance provided by the Board regarding deviations from the provisions of a registered/revised plan and/or methodology and iii) the data and calculation of GHG emission reductions are correct.

A corrective action request (CAR) is issued, where:

- Non-conformities with the monitoring plan or methodology are found in monitoring and reporting has not been sufficiently documented by the project participants, or if the evidence provided to prove conformity is insufficient;
- Modifications to the implementation, operation and monitoring of the registered project activity has not been sufficiently documented by the project participants;
- Mistakes have been made in applying assumptions, data or calculations of emission reductions which will impair the estimate of emission reductions;
- Issues identified in a FAR during validation or previous verification(s) to be verified during next verification have not been resolved by the project participants.

A clarification request (CL) shall be 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 issued for actions if the monitoring and reporting require attention and/or adjustment for the next monitoring period.

All findings were satisfactorily addressed by the project participant in the MR.

SECTION E. Verification findings

E.1. Compliance of the monitoring report with the monitoring report form

Means of verification	KFQ has checked the MR provided by the PP against the latest monitoring report form in order to determine, whether the MR is in compliance with it.
Findings	The PP submitted the MR (version 1.0 of 13/04/2016 and version 1.1 of 31/05/2016) to DOE applying the Monitoring Report Form Version 05.1. It is found that there are no deviations between the MR and the latest monitoring report form. It is identified during document review that the MR has no blank section.
Conclusion	The verification team concludes that the MR (Version 1.0 and 1.1) are in compliance with the latest monitoring report form (Version 5.1) and the instructions therein.

E.2. Remaining forward action requests from validation and/or previous verification

>>

There was a forward action request (FAR) raised from validation and no FAR was raised from previous verification. The FAR was sufficiently addressed by the PPs. Please refer to Appendix 4 of this report for more details with regard to the FAR from validation.

E.3. Compliance of the project implementation with the registered project design document

Means of verification	<p>Physical project implementation During the on-site visit, the KFQ verification team visually inspected the installations of the EnviNOx® system and all instrumentations necessary for the monitoring of the emission reductions and checked, whether all physical features of the CDM Project activity, including the data collection systems and storage, have been implemented in accordance with the registered PDD (Version 1.4 dated 22/06/2012) and the monitoring plan. Also, the KFQ verification team reviewed the documentation in respect of start-up and operation of the EnviNOx® systems, monitoring instrument specifications including containing details such as instrument history and measuring ranges.</p> <p>Project operation The verification team checked the operational records, catalyst invoices and other relevant information (Appendix 3) and interviewed relevant plant staff on the actual operation and campaigns of the nitric acid plant and the EnviNOx® system. Also daily reports, event log files, service reports, maintenance & calibration reports, DeltaV curves and detecting process of events were checked by the KFQ verification team, especially with regard to times with shutdowns and special events, as indicated in the MR.</p> <p>Management system and quality control and quality assurance The operation procedures and QA/QC procedures and respective reports have been reviewed and crosschecked by the KFQ verification team. Furthermore, the latest organizational arrangements were checked by means of interviews with relevant staff from Hu-Chems and Carbon Climate Protection GmbH (hereinafter referred to as "CCP").</p>
Findings	<p>Physical project implementation The project covers a catalytic N₂O reduction technology in its nitric acid plant Hu-</p>

Chems #5. The project was registered on 17/07/2012 and the new nitric acid plant #5 was scheduled to operate in 2012 and the starting period of crediting period was 01/09/2012 as per the registered PDD. However the project has been in operation since 25/02/2013 and the starting date of crediting period has changed from 01/09/2012 to 25/02/2013. This change to the starting date of the crediting period was already done before this Monitoring Period approved by the UNFCCC Secretariat via E-mail and was published on the relevant project view page.

The starting date of operation of the project activity with putting all physical features and data collection system and storage in place was confirmed by KFQ verification team. The implementation status of the project activity was the same during the monitoring period and found to be in accordance with the relevant documentation.

Project operation

During the monitoring period, in total lasting for 213 days, the nitric acid plant Hu-Chems #5 as well as its EnviNOx® system was in normal operation, except during the downtimes as mentioned in the MR. The KFQ verification team can confirm that during these downtimes, no emission reductions were claimed by the PPs. Information on catalyst campaigns & compositions were according to the information stated in the MR.

The monitoring system & data collection system were operational during the monitoring period.

During the site visit it was found through interview with staff and sample review of trend curves for raw data that there was a typographical error with regard to the time of relevant observations on 24/09/2015 in the MR. (Refer to Appendix 4 / Table 2/ CL ID 01).

After the PP has submitted the revised MR (Version 1.1), it is found that there are no inconsistencies between the MR and the actual situation anymore.

Management system and Quality assurance

KFQ found that the project is operated and monitored by Hu-Chems, responsibility for checking & reporting of data under the CDM activity has been contracted to CARBON CDM Korea Ltd. (hereinafter referred to as "CARBON") and is supervised by CCP. The procedures & responsibilities are described in the MR and are considered applied in full. There are no deviations between the MR and the actual situation.

With respect to quality control and quality assurance, the KFQ verification team found that the EnviNOx system and the monitoring system are designed as an automatic process, so the involvement of the personnel during normal operation is minimised. In case of any deficiency, appropriate procedures are in place. The MR includes a detailed description of the periodical observations of the EnviNOx system and the monitoring instruments, in case of failures responsibilities are defined.

It has been found that a service agreement is in place for the analyser system and the DeltaV system between Hu-Chems and Emerson Process Management Korea Ltd. The contract covers regular preventive checks on operational condition of the analyser system (on a monthly basis), "On site" DeltaV system health checks (on a monthly basis), 24 hour emergency service, inspections visits (on a quarterly basis) and respective reporting. Service reports of performed maintenance activities, calibrations and checks and other service reports (where applicable) were made available for verification and were found to be complete & suitable. Data handling solutions involve redundancy check, data manipulation protection, integrity check as well as archiving and were also found to be suitable. Safeguarding procedures in accordance to the monitoring plan have been applied in a conservative way.

KFQ found that the quality assurance and quality control procedures in terms of equipment operation, maintenance, calibration as well as data reporting are covered by project operator's management system which is certified to comply with ISO 9001:2009 and ISO 14001:2009, certification has found to be valid during the whole monitoring period. Hu-Chems covers all CDM activities in the internal, external audit and management reviews.

	It was found that local operators and instrumentation engineers of the system have been trained by the equipment suppliers. The related procedures were kept on site and were easily available.
Conclusion	<p>KFQ confirms that the project has been implemented according to the description in the registered PDD. The raised CL (ID 01) has been completely resolved.</p> <p>The verification team specifically confirms that</p> <ul style="list-style-type: none"> • All physical features of the proposed CDM project activity including data collection systems and storage are in place and in accordance with the registered PDD; and • All other relevant information provided in the MR is fully in accordance with respective information stated in the registered PDD; and • The information on project operation, the management system and quality assurance are complete, correct and in accordance with the registered PDD; and • The management system and quality assurance and related procedures have implemented as described in the MR and in accordance with the registered PDD.

E.4. Post-registration changes

E.4.1. Temporary deviations from the registered monitoring plan, monitoring methodology or standardized baseline

There were no post registration changes identified by verification team during this verification.

E.4.2. Corrections

There were no post registration changes identified by verification team during this verification.

E.4.3. Changes to the start date of the crediting period

There were no temporary deviations applied to this monitoring period.

Already before this Monitoring Period, the start date of the crediting period was changed from 01/09/2012 (indicated date in the registered PDD) to 25/02/2013 (start of regular operation of the EnviNOx® system). This change to the starting date of the crediting period was approved by the UNFCCC Secretariat via E-mail and was published on the relevant project view page.

E.4.4. Inclusion of a monitoring plan to a registered project activity

There were no post registration changes identified by verification team during this verification.

E.4.5. Permanent changes from registered monitoring plan, monitoring methodology or standardized baseline

There were no post registration changes identified by verification team during this verification.

E.4.6. Changes to the project design of a registered project activity

There were no post registration changes identified by verification team during this verification.

E.4.7. Types of changes specific to afforestation and reforestation project activities

N/A

E.5. Compliance of monitoring plan with the monitoring methodology including applicable tool and standardized baseline

Means of verification	The KFQ verification team reviewed the monitoring plan contained in the registered PDD, version 1.4 dated 22/06/2012 against the approved methodology applied by the project activity, ACM0019 (version 01) and "Tool to determine the mass flow of a greenhouse gas in a gaseous steam" (version 03.0).
Findings	The KFQ verification team found that there were no incompliances between the monitoring plan contained in the registered PDD, the applied methodology ACM0019 (Version 01) and "Tool to determine the mass flow of a greenhouse gas in a gaseous steam" (version 03.0). Furthermore it was found that there were no standardized baselines applied in the project activity.
Conclusion	KFQ confirms that the monitoring plan is in accordance with the approved methodology applied by the project activity, ACM0019 (version 01) and "Tool to determine the mass flow of a greenhouse gas in a gaseous steam" (version 03.0). There is also no applicable standardized baseline for the project activity.

E.6. Compliance of monitoring activities with the registered monitoring planGeneral statement on data and parameters monitored

Means of verification	The means of verification in relation to the different parts (Information flow and data collection system, monitoring parameters) are stated in detail in the section & tables further below.
Findings	The findings in relation to the different parts (Information flow and data collection system, monitoring parameters) are stated in detail in the section & tables further below.
Conclusion	<p>KFQ confirms that the monitoring is complete and has been carried out in accordance with the monitoring plan and any monitoring activities comply with it. The monitoring plan has been properly implemented and is followed by the PPs.</p> <p>KFQ confirms that all parameters stated in the monitoring plan and relevant board decisions have been monitored and updated as applicable, including project emission parameters, baseline emission parameters (leakage is not applicable) and management and operational system: the responsibilities and authorities for monitoring and reporting are in accordance with the responsibilities and authorities stated in the monitoring plan.</p> <p>KFQ confirms that the equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan, the applied methodology as well as methodological tools and the relevant guidance provided by the CDM Executive Board. Details on calibration are given in section E.7 below.</p> <p>KFQ confirms that monitoring results are consistently recorded as per the approved frequency.</p> <p>KFQ confirms that QA/QC procedures have been applied in accordance with the monitoring plan.</p> <p>KFQ confirms that the MR lists each parameter required by the monitoring plan and the information flow (i.e. from data generation, aggregation, recording, calculation and reporting) for these parameters is provided in the MR (The information flow for each parameter is further verified in the following sections).</p> <p>KFQ confirms that the monitoring methodologies and sustaining records are sufficient to enable verification of emission reductions.</p>

E.6.1. Data and parameters fixed ex ante or at renewal of crediting period

Means of verification	'Data and parameters fixed ex-ante' listed in the MR have been crosschecked & reviewed against – as applicable – the monitoring plan contained in the registered PDD as well as applied methodology ACM0019 (Version 01), Tool to determine the mass flow of a greenhouse gas in a gaseous steam (Version 03.0) and other relevant CDM related documentation.			
Findings	Data & Parameters fixed ex-ante and generally relevant for the project activity			
	Data/parameter (description, unit)	Source of data	Value(s) applied	KFQ Findings
	• $EF_{default,y}$ Default N_2O baseline emissions factor in the calendar year y of the monitoring period n (kg N_2O /t HNO_3)	PDD / ACM0019 (ver. 01)	3.40 (in 2015) 3.20 (in 2016)	Crosscheck of the value with the registered PDD & Monitoring plan and the applied methodology showed compliance of parameter.
	• GWP_{N_2O} Global warming potential of N_2O (t CO_2e /t N_2O)	Relevant decisions by the CMP (2 nd Kyoto protocol commitment period) & according to the registered PDD / ACM0019 (ver. 01)	298	Value is correctly applied & justified and has been determined in accordance with the provisions of the CDM project standard, the PDD and ACM0019 (Version 01).
	• R_u Universal ideal gases constant (Pa.m ³ /kmol.K)	PDD / "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (ver. 03.0)	8,314	Crosscheck of the value with the registered PDD & Monitoring plan and the applied methodology showed compliance of parameter.
	• MM_i Molecular mass of greenhouse gas i (kg/kmol)	PDD / "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (ver. 03.0)	44.02	Crosscheck of the value with the registered PDD & Monitoring plan and the applied methodology showed compliance of parameter.
	A complete set of data covering the monitoring period has been provided to KFQ and been reviewed during verification.			
Conclusion	KFQ confirms that all data and parameters fixed ex ante such as emission factors, etc. are explicitly mentioned in the MR and have been correctly and consistently applied. All values are in compliance with relevant documentation such as the monitoring plan and the registered PDD, applied methodology ACM0019 (Version 01), Tool to determine the mass flow of a greenhouse gas in a gaseous steam (Version 03.0) and other CDM related documentation, where applicable.			

E.6.2. Data and parameters monitoredInformation flow & data collection system

Means of verification	The KFQ verification team assessed the information flow and data collection system and by means of physical inspection of all major components of the information flow & data collection system as well as related documentation. Interviews with relevant staff were held in order to experience the system in action. Furthermore, the verification of the information flow (where applicable) for all monitoring parameters was successfully done by means of following documents and cross checks:
------------------------------	--

	<p><i>Data generation and aggregation:</i></p> <ul style="list-style-type: none"> • Calibration records and certificates • Monthly Health Check reports • Quarterly Inspection Check Reports • General Maintenance service reports • Plausibility of tail gas flow volume flows with ex-ante values in the PDD • Monthly Emerson Service Reports, confirming the functionality of the data transmission system for all instruments • Certificate of analysis of the standard test gas for analyser calibration • Intervals (measuring frequency, reading frequency, recording frequency) of instruments for each instrument are also verified through display panel on-site and DCS generated <p><i>Aggregation to recording:</i></p> <ul style="list-style-type: none"> • Monthly Emerson Service Reports, confirming the functionality of the data storage system for all instruments • Data cross check between values from analysers/transmitters and values in control room • Data cross check between DeltaV Trend curves (directly generated from raw data) and DeltaV Reports <p><i>Calculation and reporting:</i></p> <ul style="list-style-type: none"> • Crosscheck of implemented calculations in Excel sheets against the PDD formulae • Data cross check between DeltaV Report, production reports, and Excel Sheets
Findings	<p>As stated in the MR and verified by the KFQ verification team, common data flow systems are used in the project activity for the following parameters:</p> <ul style="list-style-type: none"> • Nitric acid production ($P_{NA,n}$) • Operating parameter of the nitric acid plant (NH_3 flow to AOR for determining h_n) • Volumetric flow, temperature and pressure of the tail gas stream ($V_{t,db}$, T_t, P_t) • Volumetric fraction of N_2O in the tail gas stream ($v_{i,t,db}$) <p>KFQ also verified that the instrument transmitters continuously provide an analogue signal to I/O cards and the signals are collected by a DCS Processor (DeltaV, respectively). Thus collected and processed data, i.e. calculation, raw data, calculated values, are stored in the server continuously and available in the network system as digital values. DCS System (DeltaV, respectively) also generates aggregated daily reports based on the raw data stored at the delegated server. Data are digitally transferred to the Excel sheets, where calculations of emission reductions are performed.</p> <p>It was found by the KFQ verification team, that the information flow & data collection system are fully functional and were so during the whole verification period covered under this verification. Respective documents and results were made available to KFQ for verification.</p>
Conclusion	<p>The KFQ verification team confirms that the information flow & data collection system meets the requirements of the registered PDD and its monitoring plan as per the applied and approved methodology, ACM0019 (Version 01) as well as the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 03.0). Intervals (measuring frequency, reading frequency and recording frequency) are applied in accordance with the applied methodology, the above mentioned tools and the monitoring plan.</p>

Assessment on data/ parameters

The table out of the CDM-VCR-FORM has been used for the assessment, following rows as needed have been added: Data/Parameter, Unit, Description, Source of data used, Value(s)

Data/Parameter	P_{NA,n}
Data Unit	tHNO ₃
Description	Nitric acid produced in the monitoring period n
Source of data used	Production reports (based on measurements from project participants)
Value(s)	252,876 tHNO ₃ (total value in the monitoring period)
Means of verification	<p>The KFQ verification team checked, whether the monitoring activities in relation to this parameter comply with the monitoring plan by physically inspecting the applied measuring device & related equipment for generation, aggregation, recording and reporting. The verification team checked the DCS daily reports and compared the values reported in the excel spreadsheets. All results have been verified against the requirements out of the monitoring plan and the applied methodology.</p> <p>Furthermore, procedures and records on calibration, maintenance and QA/QC activities have been reviewed, discussed in interviews and checked against the requirements out of the monitoring plan and the applied methodology.</p>
Findings	<p>Locations of instruments have been verified by physical inspection and are in accordance with the description in the MR. All specifications in relation of this parameter are fulfilled and suitable instruments and ranges are used. Monitoring results are fully available at the required intervals for the whole monitoring period.</p> <p>The nitric acid flow and density are measured with a mass flow meter, temperature with a temperature measurement and concentration is automatically 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 through the DeltaV System. Data from the DeltaV daily reports are digitally transferred to spreadsheets where emission reduction calculations are performed. There were no errors found in the digital transfer of data from the DeltaV daily reports to the spreadsheets.</p> <p>The calibration and maintenance routines for the parameter are the responsibility of Hu-Chems. The QA/QC and related procedures are covered by the ISO 9001 / ISO 14001 Quality Management Procedures of the nitric acid plant and considered appropriate by the verification team. Valid calibration certificates covering the whole monitoring period are available for the used equipment. It was found that the calibrations were carried out for a measuring range comparable with the actual measuring range and that the calibrations confirmed proper functioning of the monitoring equipment.</p>
Conclusion	<p>KFQ confirms that the monitoring of this parameter has been carried out in accordance with the monitoring plan and any monitoring activities comply with it. KFQ confirms that monitoring results of this parameter are consistently recorded as per the approved frequency.</p> <p>KFQ confirms that the equipment used for monitoring of this parameter is calibrated in accordance with the monitoring plan, the applied methodology as well as methodological tools and the relevant guidance provided by the CDM Executive Board. Details on calibration are given in section E.7 below.</p> <p>KFQ confirms that QA/QC procedures are suitable and have been applied in accordance with the monitoring plan.</p>

Data/Parameter	h_n
Data Unit	-
Description	Number of hours of operation in a monitoring period n
Source of data used	Measuring device
Value(s)	5,040 (total value in the monitoring period)
Means of verification	<p>As per the PDD, the flow of NH₃ to the ammonia oxidation reactor indicates the operational status. 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 normal operation. KFQ has checked, whether this has been correctly determined in the MS Excel sheets based on measured data, in accordance with the PDD and the respective monitoring plan.</p>

	<p>The KFQ verification team also checked, whether the monitoring activities in relation to the volume flow to the AOR comply with the monitoring plan by physically inspecting the applied measuring device & related equipment for generation, aggregation, recording and reporting. The verification team checked the DCS daily reports and compared the values reported in the excel spreadsheets. All results have been verified against the requirements out of the monitoring plan and the applied methodology.</p> <p>Furthermore, procedures and records on calibration, maintenance and QA/QC activities have been reviewed, discussed in interviews and checked against the requirements out of the monitoring plan and the applied methodology.</p>
Findings	<p>Location of instrument for measuring the NH₃ flow to the AOR has been verified by physical inspection and is in accordance with the description in the MR. All specifications in relation of this parameter are fulfilled and suitable instrument and ranges are used. Monitoring results are fully available at the required intervals for the whole monitoring period.</p> <p>The flow of NH₃ to the ammonia oxidation reactor indicates the operational status. 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 normal operation. This has been confirmed by the plant designer UHDE, as stated in the registered PDD.</p> <p>The instrument continuously provides an analogue signal to an I/O card. Data are made available in the network system as digital values and are stored by a server. DCS System generates aggregated daily reports based on stored raw data. Data from daily reports are digitally transferred to spreadsheets, where emission reduction calculations are performed. There were no errors in the digital transfer of data from the DCS daily reports to the spreadsheets. It was found that the determination of the parameter based on measured values has been implemented correctly in the spreadsheets and is traceable and transparent. Values over the monitoring period are correct.</p>
Conclusion	<p>KFQ confirms that the monitoring of this parameter has been carried out in accordance with the monitoring plan and any monitoring activities comply with it. KFQ confirms as well that</p> <ul style="list-style-type: none"> • The monitoring of the volume flow to the AOR has been carried out in accordance with the monitoring plan and any monitoring activities comply with it ; and • The monitoring results of the volume flow to the AOR are consistently recorded as per the approved frequency ; and • KFQ confirms that the equipment used for monitoring of this parameter is calibrated in accordance with the monitoring plan, the applied methodology as well as methodological tools and the relevant guidance provided by the CDM Executive Board. Details on calibration are given in section E.7 below ; and • The QA/QC procedures are suitable and have been applied in accordance with the monitoring plan.

Data/Parameter	$V_{t,db}$
Data Unit	m ³ dry gas/h
Description	Volumetric flow of the gaseous stream in time interval t on a dry basis
Source of data used	Measuring device
Value(s)	257,442 m ³ dry gas/h (average value in the monitoring period)
Means of verification	<p>The KFQ verification team checked, whether the monitoring activities in relation to this parameter comply with the monitoring plan by physically inspecting the applied measuring device & related equipment for generation, aggregation, recording and reporting. Furthermore, the KFQ verification team performed data checks between trend curves (generated from raw data) and DCS daily reports. Furthermore, the verification team checked the DCS daily reports and the values reported in the excel spreadsheets. All results have been verified against the requirements out of the monitoring plan, the applied methodology and the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 03.0).</p>

	Furthermore, procedures and records on calibration, maintenance as well as QA/QC and EN 14181 related activities have been reviewed, discussed in interviews and checked against the requirements out of the monitoring plan and the applied methodology.
Findings	<p>Location of instrument has been verified by physical inspection and is in accordance with the description in the MR. All specifications in relation of this parameter are fulfilled and suitable instrument and range are used. Monitoring results are fully available at the required intervals for the whole monitoring period.</p> <p>The instrument continuously provides an analogue signal to an I/O card. Data are made available in the network system as digital values and are stored by a server. DCS System generates aggregated daily reports based on stored raw data. Data from daily reports are digitally transferred to spreadsheets, where emission reduction calculations are performed. There were no errors in the digital transfer of data from the DCS daily reports to the spreadsheets.</p> <p>The calibration and maintenance routines for the parameter are the responsibility of Hu-Chems. The QA/QC and related procedures are covered by the ISO 9001 / ISO 14001 Quality Management Procedures of the nitric acid plant. In addition, QA is covered by EN 14181, especially QAL2 reference measurements (calibration).</p> <p>However, it was identified that the calibration frequency of QAL2 is 3 years according to the internal recommendation of Hu-Chems, and there was a two-day gap between the penultimate QAL2 audit and the latest QAL2 audit. Thus, a CL was raised (Appendix 4/ Table 2/ CL ID 02).</p> <p>After the PP has submitted clarification with regard to the calibration frequency of QAL2 as well as a revision of the monitoring report (Version 1.1), it is found that valid calibration covering the whole monitoring period is available for the used equipment. The correction factor out of the calibration curve determined during the QAL 2 reference measurement (calibration) has been correctly applied on an hourly basis in the emission reduction spreadsheet. It was found that the calibrations were carried out for a measuring range comparable with the actual measuring range and that the calibrations confirmed proper functioning of the monitoring equipment.</p>
Conclusion	<p>KFQ confirms that the monitoring of this parameter has been carried out in accordance with the monitoring plan and any monitoring activities comply with it. KFQ confirms that monitoring results of this parameter are consistently recorded as per the approved frequency.</p> <p>KFQ confirms that the equipment used for monitoring of this parameter is calibrated in accordance with the monitoring plan, the applied methodology as well as methodological tools and the relevant guidance provided by the CDM Executive Board. Details on calibration are given in section E.7 below.</p> <p>KFQ confirms that QA/QC procedures are suitable and have been applied in accordance with the monitoring plan.</p> <p>The raised CL (ID 02) has been also completely resolved.</p>

Data/Parameter	$V_{i,t,db}$
Data Unit	m ³ gas i/m ³ dry gas
Description	Volumetric fraction of greenhouse gas i in a time interval t on a dry basis
Source of data used	Measuring device
Value(s)	$2.67 \cdot 10^{-5}$ m ³ N ₂ O / m ³ dry gas (average value in the monitoring period)
Means of verification	<p>The KFQ verification team checked, whether the monitoring activities in relation to this parameter comply with the monitoring plan by physically inspecting the applied measuring device & related equipment for generation, aggregation, recording and reporting. Furthermore, the KFQ verification team performed data checks between trend curves (generated from raw data) and DCS daily reports. Furthermore, the verification team checked the DCS daily reports, QAL2 & 3 results and the values reported in the excel spreadsheets. All results have been verified against the requirements out of the monitoring plan and the applied methodology.</p> <p>Furthermore, procedures and records on calibration, maintenance and QA/QC activities have been reviewed, discussed in interviews and checked against the</p>

	requirements out of the monitoring plan and the applied methodology.
Findings	<p>Location of instrument has been verified by physical inspection and is in accordance with the description in the MR. All specifications in relation of this parameter are fulfilled and suitable instrument and range are used. Monitoring results are fully available at the required intervals for the whole monitoring period.</p> <p>The instrument continuously provides an analogue signal to an I/O card. Data are made available in the network system as digital values and are stored by a server. The N₂O concentration is measured in ppmv and automatically converted to 'm³ N₂O/Nm³ dry gas' according to the applied methodology and tool.</p> <p>The calibration and maintenance routines for the parameter are the responsibility of Hu-Chems. The QA/QC and related procedures are covered by the ISO 9001 / ISO 14001 Quality Management Procedures of the nitric acid plant. In addition, QA is covered by EN 14181, especially QAL 2 reference measurements (calibration).</p> <p>However, it was identified that the calibration frequency of QAL2 is 3 years according to the internal recommendation of Hu-Chems, and there was a two-day gap between the penultimate QAL2 audit and the latest QAL2 audit. Thus, a CL was raised (Appendix 4/ Table 2/ CL ID 02).</p> <p>After the PP has submitted clarification with regard to the calibration frequency of QAL2 as well as a revision of the monitoring report (Version 1.1), it is found that valid calibration covering the whole monitoring period is available for the used equipment. The correction factor out of the calibration curve determined during the QAL2 reference measurement (calibration) as well as results from QAL3 (if applicable) has been correctly applied on an hourly basis in the emission reduction spreadsheet. In this monitoring period, no correction to the raw data was done as all data in zero/span test were in permissible range as shown in the SHEWHART control charts of QAL 3 which were conducted as per EN 14181.</p> <p>It was found that the calibrations were carried out for a measuring range comparable with the actual measuring range and that the calibrations confirmed proper functioning of the monitoring equipment.</p>
Conclusion	<p>KFQ confirms that the monitoring of this parameter has been carried out in accordance with the monitoring plan and any monitoring activities comply with it.</p> <p>KFQ confirms that monitoring results of this parameter are consistently recorded as per the approved frequency.</p> <p>KFQ confirms that the equipment used for monitoring of this parameter is calibrated in accordance with the monitoring plan, the applied methodology as well as methodological tools and the relevant guidance provided by the CDM Executive Board. Details on calibration are given in section E.7 below.</p> <p>KFQ confirms that QA/QC procedures are suitable and have been applied in accordance with the monitoring plan and the applied methodology.</p> <p>The raised CL (ID 02) has been also completely resolved.</p>

Data/Parameter	T _t
Data Unit	K
Description	Temperature of the gaseous stream in time interval t
Source of data used	Measuring device
Value(s)	406.13 K (average value in the monitoring period)
Means of verification	<p>The KFQ verification team checked, whether the monitoring activities in relation to this parameter comply with the monitoring plan by physically inspecting the applied measuring device & related equipment for generation, aggregation, recording and reporting. The verification team checked the DCS daily reports and compared the values reported in the excel spreadsheets. All results have been verified against the requirements out of the monitoring plan and the applied methodology.</p> <p>Furthermore, procedures and records on calibration, maintenance and QA/QC activities have been reviewed, discussed in interviews and checked against the requirements out of the monitoring plan and the applied methodology.</p>
Findings	Location of instrument has been verified by physical inspection and is in accordance with the description in the MR. All specifications in relation of this parameter are

	<p>fulfilled and suitable instrument and range are used. Monitoring results are fully available at the required intervals for the whole monitoring period.</p> <p>The instrument continuously provides an analogue signal to an I/O card. Data are made available in the network system as digital values and are stored by a server. DCS System generates aggregated daily reports based on stored raw data. Data from daily reports are digitally transferred to spreadsheets, where emission reduction calculations are performed. There were no errors in the digital transfer of data from the DCS daily reports to the spreadsheets.</p> <p>The calibration and maintenance routines for the parameter are the responsibility of Hu-Chems. The QA/QC and related procedures are covered by the ISO 9001 / ISO 14001 Quality Management Procedures of the nitric acid plant and considered appropriate by the verification team. Valid calibration certificates covering the whole monitoring period are available for the used equipment.</p>
Conclusion	<p>KFQ confirms that the monitoring of this parameter has been carried out in accordance with the monitoring plan and any monitoring activities comply with it. KFQ confirms that monitoring results of this parameter are consistently recorded as per the approved frequency.</p> <p>KFQ confirms that the equipment used for monitoring of this parameter is controlled and calibrated in accordance with the monitoring plan as well as the applied methodology and as per the relevant guidance provided by the CDM Executive Board. Details on calibration are given in section E.7 below.</p> <p>KFQ confirms that QA/QC procedures are suitable and have been applied in accordance with the monitoring plan and the applied methodology.</p>

Data/Parameter	P_t
Data Unit	Pa
Description	Pressure of the gaseous stream in time interval t
Source of data used	Measuring device
Value(s)	101,124 Pa (average value in the monitoring period)
Means of verification	<p>The KFQ verification team checked, whether the monitoring activities in relation to this parameter comply with the monitoring plan by physically inspecting the applied measuring device & related equipment for generation, aggregation, recording and reporting. The verification team checked the DCS daily reports and compared the values reported in the excel spreadsheets. All results have been verified against the requirements out of the monitoring plan and the applied methodology.</p> <p>Furthermore, procedures and records on calibration, maintenance and QA/QC activities have been reviewed, discussed in interviews and checked against the requirements out of the monitoring plan and the applied methodology.</p>
Findings	<p>Location of instrument has been verified by physical inspection and is in accordance with the description in the MR. All specifications in relation of this parameter are fulfilled and suitable instrument and range are used. Monitoring results are fully available at the required intervals for the whole monitoring period.</p> <p>The instrument continuously provides an analogue signal to an I/O card. Data are made available in the network system as digital values and are stored by a server. DCS System generates aggregated daily reports based on stored raw data. Data from daily reports are digitally transferred to spreadsheets, where emission reduction calculations are performed. There were no errors in the digital transfer of data from the DCS daily reports to the spreadsheets.</p> <p>The calibration and maintenance routines for the parameter are the responsibility of Hu-Chems. The QA/QC and related procedures are covered by the ISO 9001 / ISO 14001 Quality Management Procedures of the nitric acid plant and considered appropriate by the verification team. Valid calibration certificates covering the whole monitoring period are available for the used equipment.</p>
Conclusion	<p>KFQ confirms that the monitoring of this parameter has been carried out in accordance with the monitoring plan and any monitoring activities comply with it. KFQ confirms that monitoring results of this parameter are consistently recorded as per the approved frequency.</p>

	<p>KFQ confirms that the equipment used for monitoring of this parameter is controlled and calibrated in accordance with the monitoring plan as well as the applied methodology and as per the relevant guidance provided by the CDM Executive Board. Details on calibration are given in section E.7 below.</p> <p>KFQ confirms that QA/QC procedures are suitable and have been applied in accordance with the monitoring plan and the applied methodology.</p>
--	---

Data/Parameter	$C_{H_2O,t,db,n}$
Data Unit	mg H ₂ O/m ³ dry gas
Description	Moisture content of the gaseous stream at normal conditions, in time interval t
Source of data used	Measurements according to the USEPA CF42 method 4 – Gravimetric determination of water content (Measurement Report)
Value(s)	Below $3 \cdot 10^3$ mg H ₂ O/m ³ dry gas (equivalent to 0.003 kgH ₂ O/m ³ dry gas)
Means of verification	The KFQ verification team checked, whether the monitoring activities in relation to this parameter comply with the monitoring plan by document review of AST/QAL2 reports issued by the qualified, external entity AIRTEC.
Findings	<p>As per the PDD, the measurements of moisture content were conducted when the calibrations of the flow meter for the gaseous stream (AST/QAL2) were carried out. Repeated measurements were performed by AIRTEC coinciding with AST/QAL2 reference measurements (AST during 16/09/2015 to 17/09/2015 and QAL2 during 27/02/2016 to 29/02/2016. The repeated measurements were conducted in accordance with USEPA CF42 method 4.</p> <p>It was found that, according to the report, the moisture content of the gaseous stream is below 0.003 kg H₂O/m³ dry gas and thus significantly below the maximum threshold value of 0.05 kg H₂O/m³ dry gas. Therefore, as stated by the PPs in the MR and according to the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream (version 03.0)", the gaseous stream is to be considered dry.</p>
Conclusion	<p>KFQ confirms that the monitoring of this parameter has been carried out in accordance with the monitoring plan and any monitoring activities comply with it.</p> <p>KFQ confirms that monitoring results of this parameter are consistently recorded as per the approved frequency.</p> <p>KFQ confirms that QA/QC procedures are suitable and have been applied in accordance with the monitoring plan & relevant tool by the performing institute (AIRTEC).</p>

E.6.3. Implementation of sampling plan

Means of verification	N/A
Findings	N/A
Conclusion	N/A

E.7. Compliance with the calibration frequency requirements for measuring instruments

General statement

Means of verification	The means of verification in relation to the specific instruments are stated in detail in the tables further below.
Findings	The findings in relation to the specific instruments are stated in detail in the tables further below.
Conclusion	<p>KFQ confirms that the calibration of the measuring equipment has been conducted as per manufacturer's specifications, applied methodology and the monitoring plan.</p> <p>KFQ confirms, that there has not been any calibration delay for any instrument affecting the verification period and thus, there is no error to be applied on any monitored parameters.</p>

The table of the CDM-VCR-FORM has been used for the assessment, following rows as needed have been added: Data/Parameter, Data Unit, Description, TAG / Serial Number, Type, Accuracy level, Calibration entity, Calibration frequency, Previous calibration (when applicable), Latest calibration, Applied period of max. permissible error (when applicable). Some parameters involve several instruments, table rows have been added as needed accordingly.

Data/Parameter	P_{NA,n}
Data Unit	tHNO ₃
Description	Nitric acid produced in the monitoring period n
TAG Number / Serial Number	TAG Number: 325-FT-5-609/ Serial number: 14290236
Type	Coriolis flow meter
Accuracy level	± 0.35%
Calibration entity	FM Tech (as per KOLAS)
Calibration frequency	60 Months
Previous calibration (if applicable)	N/A (latest calibration is valid for whole monitoring period)
Latest calibration	08/05/2015 (Validity 07/05/2020)
Applied period of max. permissible error (when applicable)	N/A (no calibration delay)
Means of verification	The KFQ verification team has visually checked the physical existence of the instrument. The KFQ verification team has checked the calibration records & instrument history against the calibration requirements as per the applied methodology, the monitoring plan as well as the available instrument specifications including manufacturer recommended frequencies.
Findings	It was found that the instrument, as stated in the MR, physically exists and could be identified by the TAG Number and the serial number. It was found that the instrument has been calibrated regularly and as per the defined requirements. No delay of calibration has been observed. It was found, that the instrument had a valid calibration covering the whole verification period and was working within the specified error ranges as per available, suitable certificates.
Conclusion	KFQ confirms that the calibration has been conducted as per the calibration frequency requirements and that the equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan and the applied methodology.
TAG Number / Serial Number	TAG Number: 325-TT-5-237/ Serial number: C2M408098
Type	Temperature transmitter
Accuracy level	±0.5 °C + (±0.03% of span)
Calibration entity	KML (as per KOLAS)
Calibration frequency	24 Months
Previous calibration (if applicable)	N/A (latest calibration is valid for whole monitoring period)
Latest calibration	07/05/2015 (Validity 06/05/2017)
Applied period of max. permissible error (when applicable)	N/A (no calibration delay)
Means of verification	The KFQ verification team has visually checked the physical existence of the instrument. The KFQ verification team has checked the calibration records & instrument history against the calibration requirements as per the applied methodology, the monitoring plan as well as the available instrument specifications including manufacturer recommended frequencies.
Findings	It was found that the instrument, as stated in the MR, physically exists and could be identified by the TAG Number and the serial number. It was found that the instrument has been calibrated regularly and as per the defined requirements. No

	delay of calibration has been observed. It was found, that the instrument had a valid calibration covering the whole verification period and was working within the specified error ranges as per available, suitable certificates.
Conclusion	KFQ confirms that the calibration has been conducted as per the calibration frequency requirements and that the equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan and the applied methodology.

Data/Parameter	h_n
Data Unit	-
Description	Number of hours of operation in a monitoring period n
TAG Number / Serial Number	TAG Number: 325-FT-5-520/ Serial number: 14288859
Type	Coriolis flow meter
Accuracy level	$\pm 0.35\%$
Calibration entity	FM Tech (as per KOLAS)
Calibration frequency	60 Months
Previous calibration (if applicable)	N/A (latest calibration is valid for whole monitoring period)
Latest calibration	08/05/2015 (Validity 07/05/2020)
Applied period of max. permissible error (when applicable)	N/A (no calibration delay)
Means of verification	The KFQ verification team has visually checked the physical existence of the instrument. The KFQ verification team has checked the calibration records & instrument history against the calibration requirements as per the applied methodology, the monitoring plan as well as the available instrument specifications including manufacturer recommended frequencies.
Findings	It was found that the instrument, as stated in the MR, physically exists and could be identified by the TAG Number and the serial number. It was found that the instrument has been calibrated regularly and as per the defined requirements. No delay of calibration has been observed. It was found, that the instrument had a valid calibration covering the whole verification period and was working within the specified error ranges as per available, suitable certificates.
Conclusion	KFQ confirms that the calibration has been conducted as per the calibration frequency requirements and that the equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan and the applied methodology.

Data/Parameter	$V_{t,db}$
Data Unit	m ³ dry gas/h
Description	Volumetric flow of the gaseous stream in time interval t on a dry basis
TAG Number / Serial Number	TAG Number: 325-FT-5-522/ Serial number: 1230726
Type	Differential pressure transmitter
Accuracy level	$\pm 2\%$ of span
Calibration entity	AIRTEC
Calibration frequency	60 months (EN 14181/QAL2)
Previous calibration (if applicable)	25/02/2013 to 28/02/2013
Latest calibration	27/02/2016 to 29/02/2016 (Validity: 26/02/2021)
Applied period of max. permissible error (when applicable)	N/A (no calibration delay)
Means of verification	The KFQ verification team has visually checked the physical existence of the instrument. The KFQ verification team has checked the calibration records &

	instrument history against the calibration requirements as per the applied methodology and the monitoring plan as well as instrument specifications including EN 14181 required frequencies.
Findings	<p>It was found that the instrument, as stated in the MR, physically exists and could be identified by the TAG Number and the serial number. It was found that the instrument has been calibrated regularly and as per the defined requirements.</p> <p>However, it was identified that the calibration frequency of QAL2 is 3 years according to the internal recommendation of Hu-Chems, and there was a two-day gap between the penultimate QAL2 audit and the latest QAL2 audit. Thus, a CL was raised (Appendix 4/ Table 2/ CL ID 02).</p> <p>After the PP has submitted clarification with regard to the calibration frequency of QAL2 as well as a revision of the monitoring report (Version 1.1), it is found that valid calibration covering the whole monitoring period is available for the used equipment and no delay of calibration has been observed.</p> <p>In according with EN 14181, QAL2 reference measurement was performed by AIRTEC during 25/02/2013 to 28/02/2013 and 27/02/2016 to 29/02/2016. The technical features of instrument in terms of the CDM Project / Monitoring were exactly the same since the start of the monitoring period. Through the interview with PPs and reviewing QAL2 report, KFQ can confirm that the measurements done in February 2013 and February 2016 are representative for the monitoring period due to same reliability of instrument.</p> <p>Valid QAL1 certification was found to be in place and available.</p>
Conclusion	<p>KFQ confirms that the calibration has been conducted as per the calibration frequency requirements and that the equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan and the applied methodology.</p> <p>The raised CL (ID 02) has been also completely resolved.</p>

Data/Parameter	$V_{i,t,db}$
Data Unit	m ³ gas i/m ³ dry gas
Description	Volumetric fraction of greenhouse gas i in a time interval t on a dry basis
TAG Number / Serial Number	TAG Number: 325-AT-5-018/ Serial number: 393709203380368
Type	NDIR Analyzer
Accuracy level	± 1% (zero/span)
Calibration entity	AIRTEC
Calibration frequency	60 months (EN 14181/QAL2)
Previous calibration (if applicable)	25/02/2013 to 28/02/2013
Latest calibration	27/02/2016 to 29/02/2016 (Validity: 26/02/2021)
Applied period of max. permissible error (when applicable)	N/A (no calibration delay)
Means of verification	The KFQ verification team has visually checked the physical existence of the instrument. The KFQ verification team has checked the calibration records & instrument history against the calibration requirements as per the applied methodology and the monitoring plan as well as instrument specifications including EN 14181 required frequencies.
Findings	<p>It was found that the instrument, as stated in the MR, physically exists and could be identified by the TAG Number and the serial number. It was found that the instrument has been calibrated regularly and as per the defined requirements.</p> <p>However, it was identified that the calibration frequency of QAL2 is 3 years according to the internal recommendation of Hu-Chems, and there was a two-day gap between the penultimate QAL2 audit and the latest QAL2 audit. Thus, a CL was raised (Appendix 4/ Table 2/ CL ID 02).</p>

	<p>After the PP has submitted clarification with regard to the calibration frequency of QAL2 as well as a revision of the monitoring report (Version 1.1), it is found that valid calibration covering the whole monitoring period is available for the used equipment and no delay of calibration has been observed.</p> <p>In accordance with EN 14181, QAL2 reference measurement was performed by AIRTEC during 25/02/2013 to 28/02/2013 and 27/02/2016 to 29/02/2016. The technical features of instrument in terms of the CDM Project / Monitoring were exactly the same since the start of the monitoring period. Through the interview with PPs and reviewing QAL 2 report, KFQ can confirm that the measurements done in February 2013 and February 2016 are representative for the monitoring period due to same reliability of instrument. Valid QAL1 certification was found to be in place and available.</p> <p>Furthermore, the analyser is self-calibrated (zero, span) using a set of certified calibration gases as QAL 3 in accordance with EN 14181. The calibration gases applied were marked to be stable in the verifying period and cover the range of measurement. Detailed supplier certificates including information on concentration, accuracy and stability are available. The accuracy and the calibration interval of the monitoring equipment are in accordance with the relevant guidance provided by the CDM Executive Board and is controlled and calibrated in accordance with the monitoring plan and ACM0019 (version 1).</p> <p>Control check for zero/span test result was conducted as shown in the SHEWHART CONTROL CHART.</p>
Conclusion	<p>KFQ confirms that the calibration has been conducted as per the calibration frequency requirements and that the equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan and the applied methodology.</p> <p>The raised CL (ID 02) has been also completely resolved.</p>

Data/Parameter	T _t
Data Unit	K
Description	Temperature of the gaseous stream in time interval t
TAG Number / Serial Number	TAG Number: 325-TT-5-161/ Serial number: 1230727
Type	Temperature transmitter
Accuracy level	±0.5°C + (±0.03% of span)
Calibration entity	KML (as per KOLAS)
Calibration frequency	24 months
Previous calibration (if applicable)	N/A (latest calibration is valid for whole monitoring period)
Latest calibration	07/05/2015 (Validity 06/05/2017)
Applied period of max. permissible error (when applicable)	N/A (no calibration delay)
Means of verification	The KFQ verification team has visually checked the physical existence of the instrument. The KFQ verification team has checked the calibration records & instrument history against the calibration requirements as per the applied methodology, the monitoring plan as well as the available instrument specifications including manufacturer recommended frequencies.
Findings	It was found that the instrument, as stated in the MR, physically exists and could be identified by the TAG Number and the serial number. It was found that the instrument has been calibrated regularly and as per the defined requirements. No delay of calibration has been observed. It was found, that the instrument had a valid calibration covering the whole verification period and was working within the specified error ranges as per available, suitable certificates.
Conclusion	KFQ confirms that the calibration has been conducted as per the calibration frequency requirements and that the equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan and the applied

	methodology.
Data/Parameter	P_t
Data Unit	Pa
Description	Pressure of the gaseous stream in time interval t
TAG Number / Serial Number	TAG Number: 325-PT-5-362/ Serial number: 1230980
Type	Pressure transmitter
Accuracy level	$\pm 0.1\%$ of span
Calibration entity	HU-CHEMS Fine Chemical Corp.
Calibration frequency	Monthly
Previous calibration (if applicable)	Calibrated from 07/08/2015 to 16/03/2016 on a monthly basis
Latest calibration	Calibrated from 07/08/2015 to 16/03/2016 on a monthly basis
Applied period of max. permissible error (when applicable)	N/A (no calibration delay)
Means of verification	The KFQ verification team has visually checked the physical existence of the instrument. The KFQ verification team has checked the calibration records & instrument history against the calibration requirements as per the applied methodology, the monitoring plan as well as the available instrument specifications including manufacturer recommended frequencies.
Findings	It was found that the instrument, as stated in the MR, physically exists and could be identified by the TAG Number and the serial number. It was found that the instrument has been calibrated regularly and as per the defined requirements. No delay of calibration has been observed. It was found, that the instrument had a valid calibration covering the whole verification period and was working within the specified error ranges as per available, suitable certificates.
Conclusion	KFQ confirms that the calibration has been conducted as per the calibration frequency requirements and that the equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan and the applied methodology.

E.8. Assessment of data and calculation of emission reductions or net removals

E.8.1. Calculation of baseline GHG emissions or baseline net GHG removals by sinks

Means of verification	<p>KFQ has reviewed all data, parameters and calculations with respect to calculation of the baseline GHG emissions and checked them against the requirements out of the applied methodology ACM0019 (Version 01) and the PDD (Version 1.4, dated on 22/06/2012) as well as relevant tools applied.</p> <p>KFQ has also assessed the completeness, quality and appropriateness of the data, parameters and calculations.</p> <p>Furthermore, KFQ has assessed, whether any assumptions, emission factors, default values, GWPs or other reference values – as applicable – used by the PPs have been justified and correctly applied, in line with the requirements.</p> <p>KFQ has further crosschecked – as applicable - any information with other sources available, such as but not limited to production log sheets, meters available in the operators control room or on-site, etc.</p>
Findings	<p>The baseline GHG emissions have been found to be 249,476 tCO₂e for the verification period. It was found that a complete set of data covering the monitoring period has been provided by the PPs. It was found that a complete set of data covering the monitoring period has been provided by the PPs. Activity levels and non-activity parameters have been monitored in accordance with the monitoring plan, as applicable.</p> <p>The calculation was found to be correct as well as carried out in accordance with</p>

	<p>the formulae and methods described in the monitoring methodology ACM0019 (version 01) and the PDD (Version 1.4, dated on 22/06/2012).</p> <p>It was found that all emission factors, GWPs and default values and reference values, as applicable, have been correctly justified, are explicitly mentioned in the MR and have been correctly applied. It was found that no assumptions are used that have any relevant influence on reported emission reductions.</p> <p>It was found that all parameters are automatically collected by the DeltaV DCS provided by Emerson. It was found that there is no uncertainty related to manual transfer of data used in the calculation of emission reduction since the monitored parameters are automatically collected by the DeltaV DCS. All actions performed at the computer station are logged and the log file is available for KFQ. There were no errors in the digital transfer of data from DeltaV DCS files to the excel spreadsheets for the calculation of emissions reductions.</p> <p>It was found that the spreadsheets, including corresponding re-calculations of data during events as described in the MR, were made available completely by the PP and that all formulae have been correctly implemented and are accessible and traceable. Any recalculations are in line with the procedure in the registered PDD and have been checked and found to be correct and conservative. Safeguarding procedures in accordance to the monitoring plan have been applied in a conservative way. Rounding of digits, where applicable, has been applied both correctly and conservatively.</p> <p>All necessary documentation is collected, referenced and aggregated and is easily accessible in spreadsheets and daily reports in electronic format. Measurements are performed by calibrated equipment, and key data could be cross-checked via other sources (if applicable), such as raw data generated in the DCS, production log sheets and meters available in the operators control room or on-site. Further details on cross-checks for each parameter and the information flow are given in sections E.6.2 above.</p> <p>A detailed assessment of all relevant parameters for the verification period is given in E.6.1 and E.6.2 above.</p>
Conclusion	<p>KFQ confirms that all required data for calculation of the baseline GHG emissions were available for the whole verification period and no data were missing due to any non-monitoring of activity levels or non-activity parameters.</p> <p>KFQ confirms that suitable cross-checking of data was possible and has been performed as described.</p> <p>KFQ confirms that the PPs have followed appropriate methods and formulae for calculating baseline GHG emissions have been followed.</p> <p>KFQ confirms that any emission factors, GWPs and default values and reference values – as applicable – that were applied in the calculation have been justified and correctly applied. No assumptions were used.</p> <p>KFQ confirms that the calculation of the baseline GHG emissions for the covered monitoring period is fully complete and based on suitable and verifiable evidence.</p>

E.8.2. Calculation of project GHG emissions or actual net GHG removals by sinks

Means of verification	<p>KFQ has reviewed all data, parameters and calculations with respect to calculation of the project GHG emissions and checked them against the requirements out of the applied methodology ACM0019 (Version 01) and the PDD (Version 1.4, dated on 22/06/2012) as well as relevant tools applied.</p> <p>KFQ has also assessed the completeness, quality and appropriateness of the data, parameters and calculations.</p> <p>Furthermore, KFQ has assessed, whether any assumptions, emission factors, default values, GWPs or other reference values – as applicable – used by the PPs have been justified and correctly applied, in line with the requirements.</p> <p>KFQ has further crosschecked – as applicable - any information with other sources available, such as but not limited to production log sheets, meters available in the operators control room or on-site, etc.</p>
Findings	<p>The project GHG emissions have been found to be 13,877 tCO₂e for the verification period. It was found that a complete set of data covering the monitoring period has been provided by the PPs. Activity levels and non-activity parameters have been monitored in accordance with the monitoring plan, as applicable.</p> <p>The calculation was found to be correct as well as carried out in accordance with</p>

	<p>the formulae and methods described in the monitoring methodology ACM0019 (version 01) and the PDD (Version 1.4, dated on 22/06/2012) as well as relevant tools applied.</p> <p>It was found that all emission factors, GWPs and default values and reference values, as applicable, have been correctly justified, are explicitly mentioned in the MR and have been correctly applied. It was found that no assumptions are used that have any relevant influence on reported emission reductions.</p> <p>It was found that all parameters are automatically collected by the DeltaV DCS provided by Emerson. It was found that there is no uncertainty related to manual transfer of data used in the calculation of emission reduction since the monitored parameters are automatically collected by the DeltaV DCS. All actions performed at the computer station are logged and the log file is available for KFQ. There were no errors in the digital transfer of data from DeltaV DCS files to the excel spreadsheets for the calculation of emissions reductions.</p> <p>It was found that the spreadsheets, including corresponding re-calculations of data during events as described in the MR, were made available completely by the PP and that all formulae have been correctly implemented and are accessible and traceable. Any recalculations are in line with the procedure in the registered PDD and have been checked and found to be correct and conservative. Safeguarding procedures in accordance to the monitoring plan have been applied in a conservative way. Rounding of digits, where applicable, has been applied both correctly and conservatively.</p> <p>All necessary documentation is collected, referenced and aggregated and is easily accessible in spreadsheets and daily reports in electronic format. Measurements are performed by calibrated equipment, and key data could be cross-checked via other sources (if applicable), such as raw data generated in the DCS, production log sheets and meters available in the operators control room or on-site. Further details on cross-checks for each parameter and the information flow are given in sections E.6.2 above.</p> <p>A detailed assessment of all relevant parameters for the verification period is given in E.6.1 and E.6.2 above.</p>
Conclusion	<p>KFQ confirms that all required data for calculation of the project GHG emissions were available for the whole verification period and no data were missing due to any non-monitoring of activity levels or non-activity parameters.</p> <p>KFQ confirms that suitable cross-checking of data was possible and has been performed as described.</p> <p>KFQ confirms that the PPs have followed appropriate methods and formulae for calculating project GHG emissions have been followed.</p> <p>KFQ confirms that any emission factors, GWPs and default values and reference values– as applicable – that were applied in the calculation have been justified and correctly applied. No assumptions were used.</p> <p>KFQ confirms that the calculation of the baseline GHG emissions for the covered monitoring period is fully complete and based on suitable and verifiable evidence.</p>

E.8.3. Calculation of leakage GHG emissions

Means of verification	KFQ has checked, whether leakage emissions (if any) were determined by the PPs in accordance with the applied methodology, the PDD and the monitoring plan.
Findings	KFQ has found that the approach applied by the PPs that leakage emissions need not to be considered (i.e. being considered zero, consequently) is in accordance to the applied methodology ACM0019 (Version 01).
Conclusion	KFQ confirms that the PPs approach with regard to leakage GHG emissions is correct and that no leakage GHG emissions need to be considered in the project based on the applied methodology.

E.8.4. Summary of calculation of GHG emission reductions or net anthropogenic GHG removals by sinks

Means of verification	KFQ has reviewed all data, parameters and calculations with respect to calculation of the GHG emission reductions and checked them against the requirements out of the applied methodology ACM0019 (Version 01) and the PDD (Version 1.4 per 22/06/2012) as well as relevant tools applied.
------------------------------	---

	<p>KFQ has also assessed the completeness, quality and appropriateness of the data, parameters and calculations.</p> <p>Furthermore, KFQ has assessed, whether any assumptions, emission factors, default values, GWPs or other reference values – as applicable – used by the PPs have been justified and correctly applied, in line with the requirements.</p> <p>KFQ has further crosschecked – as applicable - any information with other sources available, such as but not limited to production log sheets, meters available in the operators control room or on-site, etc.</p> <p>Means of verification in respect of baseline GHG emissions, project GHG emissions and leakage GHG emissions that form the basis for calculation of the GHG emission reductions are stated in detail in sections E.8.1., E.8.2. and E.8.3. above.</p>
Findings	<p>The GHG emission reductions have been found to be 235,599 tCO₂e for the verification period. It was found that the first day on which CERs are being claimed in this verification period has been correctly specified by the PPs, being 01/09/2015. It was found that a complete set of data covering the monitoring period has been provided by the PPs. Activity levels and non-activity parameters have been monitored in accordance with the monitoring plan, as applicable.</p> <p>The calculation was found to be correct as well as carried out in accordance with the formulae and methods described in the monitoring methodology ACM0019 (Version 01) and the PDD (Version 1.4, dated on 22/06/2012) as well as relevant tools applied.</p> <p>It was found that all emission factors, GWPs and default values and reference values, as applicable, have been correctly justified, are explicitly mentioned in the MR and have been correctly applied. It was found that no assumptions are used that have any relevant influence on reported emission reductions.</p> <p>It was found that all parameters are automatically collected by the DeltaV DCS provided by Emerson. It was found that there is no uncertainty related to manual transfer of data used in the calculation of emission reduction since the monitored parameters are automatically collected by the DeltaV DCS. All actions performed at the computer station are logged and the log file is available for KFQ. There were no errors in the digital transfer of data from DeltaV DCS files to the excel spreadsheets for the calculation of emissions reductions.</p> <p>It was found that the spreadsheets, including corresponding re-calculations of data during events as described in the MR, were made available completely by the PP and that all formulae have been correctly implemented and are accessible and traceable. Any recalculations are in line with the procedure in the registered PDD and have been checked and found to be correct and conservative. Safeguarding procedures in accordance to the monitoring plan have been applied in a conservative way. Rounding of digits, where applicable, has been applied both correctly and conservatively.</p> <p>All necessary documentation is collected, referenced and aggregated and is easily accessible in spreadsheets and daily reports in electronic format. Measurements are performed by calibrated equipment, and key data could be cross-checked via other sources (if applicable), such as raw data generated in the DCS, production log sheets and meters available in the operators control room or on-site. Further details on cross-checks for each parameter and the information flow are given in sections E.6.2 above.</p> <p>A detailed assessment of all relevant parameters for the verification period is given in E.6.1 and E.6.2 above. Findings in respect of baseline GHG emissions, project GHG emissions and leakage GHG emissions, that form the basis for calculation of the GHG emission reductions, are stated in detail in sections E.8.1., E.8.2. and E.8.3. above.</p>
Conclusion	<p>KFQ confirms that all required data for the calculation of GHG emission reductions were available for the whole verification period and no data were missing due to any non-monitoring of activity levels or non-activity parameters.</p> <p>KFQ confirms that suitable cross-checking of data was possible and has been performed as described.</p> <p>KFQ confirms that the PPs have followed appropriate methods and formulae for calculating GHG emission reductions have been followed.</p> <p>KFQ confirms that any emission factors, GWPs and default values and reference values– as applicable – that were applied in the calculation have been justified and</p>

	<p>correctly applied. No assumptions were used.</p> <p>KFQ confirms that the calculation of the GHG emissions for the covered monitoring period is fully complete and based on suitable and verifiable evidence.</p> <p>KFQ confirms that the first day in which CERs are being claimed in the verification period is 01/09/2015, i.e. later than 31/12/2012. No pro-rata approach is applicable.</p> <p>KFQ finally confirms, that the amount of emission reductions claimed by the PPs for the verification period from 01/09/2015 to 31/03/2016, amounting to 235,599 tCO₂e, is correctly determined and calculated.</p>
--	--

E.8.5. Comparison of actual GHG emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

Means of verification	KFQ compared the ex-ante estimation of emission reductions in the registered PDD with the emission reductions reported by the PPs in the MR.
Findings	<p>KFQ found that the emission reductions in the PDD were estimated as 218,230 tCO₂e during the 213 days of the monitoring period. The emission reductions reported by the PPs during the same period were 235,599 tCO₂e.</p> <p>It was found, that the PPs have correctly described the situation in the MR as well.</p>
Conclusion	<p>KFQ confirms that the reported emission reductions in the MR (v1.1) are slightly higher than estimated in the PDD.</p> <p>KFQ confirms that the emission reductions claimed by the PPs are reasonable.</p>

E.8.6. Remarks on difference from estimated value in registered PDD

Means of verification	As determined in section E.8.5 above, the emission reductions of the project activity during the verification period are slightly higher than emissions reductions estimated ex-ante in the PDD, KFQ has checked the respective explanation offered by the PPs in the monitoring period.
Findings	<p>It was found that N₂O emissions were expected to be destroyed about 96% by the tertiary abatement facility in the PDD, however, 99% of N₂O emissions destruction was observed during the monitoring period.</p> <p>Therefore, KFQ considers emission reductions claimed in the monitoring period are reasonable.</p>
Conclusion	<p>KFQ confirms that the explanation for the emission reductions of the project activity during the verification period is reasonable and that there are no non-conservative aspects associated with it.</p> <p>Besides, KFQ confirms that there is no information on data and variables in the MR that is different from the registered PDD and would cause an increase in estimates of the emission reductions in the current monitoring period or in future monitoring periods.</p>

E.8.7. Actual GHG emission reductions or net anthropogenic GHG removals by sinks during the first commitment period and the period from 1 January 2013 onwards

Means of verification	The GHG emission reductions reported in the MR are 235,599 tCO ₂ e. As described in detail in <i>Section E</i> of this report, all relevant aspects of the project activity have been assessed in order to determine, whether the claimed emission reductions by the PPs are correctly determined, reasonable and fairly stated and based on verifiable evidence and in accordance with the applied methodology and the registered PDD as well as applicable tools.
Findings	It was found that the project activity is implemented and operated according to the registered PDD and the monitoring of any and all data and parameters as well as calculation of baseline GHG emissions, project GHG emissions and GHG emission reductions is complete conducted in accordance with the registered PDD, the applied methodology.
Conclusion	KFQ arrived at the conclusion that the GHG emission reductions reported in the MR and claimed by the PPs are correctly determined with 235,599 tCO ₂ e for the covered verification period between 01/09/2015 and 31/03/2016. This implies that 100% of the reported GHG emission reduction in this verification period has been achieved in a period after the end of 31/12/2012, i.e. the first commitment period is untouched by this verification period.

SECTION F. Internal quality control

According to KFQ's Procedure for deciding whether to proceed request for issuance, the final verification report and verification findings underwent a technical review before being submitted to the PPs for requesting issuance CERs. The technical review was performed by technical review team composed of a person qualified for this project activity in accordance with KFQ's qualification scheme for CDM project validation and verification.

SECTION G. Verification opinion

Through the verification of the MR of the CDM project activity : "Reduction of N₂O emissions from the new nitric acid plant #5 of Hu-Chems Fine Chemical Corp." in accordance with VVS (version 9.0), KFQ could confirm that:

- The project activity has been implemented and operated as per the registered PDD (Version 1.4, 22/06/2012).
- The installed equipment being essential for generating emission reduction runs reliably and is calibrated appropriately.
- The monitoring plan is as per the applied methodology.
- The monitoring plan in MR is as per the monitoring plan in the registered PDD.
- The monitoring system and procedures comply with the monitoring system and procedures described in the monitoring plan, and approved methodology including applicable tool(s) and generated GHG emission reductions data.
- The GHG emission reductions in the MR (v.1.1) are calculated without material misstatements.

KFQ's verification opinion refers to the project's GHG emissions and resulting GHG emission reductions reported both determined due to the valid and registered project's baseline, its monitoring plan and its associated documents.

Based on the information we have seen and evaluated, we confirm the followings:

Project Title	Reduction of N ₂ O emissions from the new nitric acid plant #5 of Hu-Chems Fine Chemical Corp.
UNFCCC Reference Number	6637
Date of registration	17/07/2012
Registered PDD	22/06/2012 (Version 1.4)
Methodology applied	ACM0019 (Version 01)
Final version of Monitoring Report	1.1 (dated 31/05/2016)
Crediting period	25/02/2013 to 24/02/2023
Monitoring period	01/09/2015 to 31/03/2016
Total GHG emission Reductions Verified	Baseline emissions: 249,476 tonnes CO _{2e} Project emissions: 13,877 tonnes CO _{2e} Leakage: 0 tonnes CO _{2e} Emission reductions: <u>235,599 tonnes CO_{2e}</u>

It is the opinion of KFQ that the amount of GHG emission reductions achieved by the project activity during this monitoring period is correct and that complies with all applicable CDM requirements.

SECTION H. Certification statement

>>

Korean Foundation for Quality has performed the periodic verification of the emission reductions that have been reported for the CDM project activity: "Reduction of N₂O emissions from the new nitric acid plant #5 of Hu-Chems Fine Chemical Corp." (UNFCCC Registration Ref. No. 6637) for the period from 01/09/2015 to 31/03/2016.

The PPs are responsible for the collection of data in accordance with the monitoring plan in the registered PDD and the reporting of GHG emissions reductions from the project. It is KFQ's responsibility to express an independent verification statement on the reported GHG emission reductions from the project.

KFQ conducted the verification on the basis of the monitoring methodology ACM0019 (Version 01), the registered PDD of 22/06/2012 (version 1.4), the validation report (dated 03/07/2012) and the MR (version 1.1) dated 31/05/2016. The verification included i) checking whether the provisions of the monitoring methodology and the monitoring plan were consistently and appropriately applied and ii) the collection of evidence supporting the reported data.

KFQ's verification approach draws on an understanding of the risks associated with reporting of GHG emission data and the controls in place to mitigate these. KFQ planned and performed the verification by obtaining evidence and other information and explanations that KFQ considers necessary to give reasonable assurance that reported GHG emission reductions are fairly stated.

In our opinion, the GHG emissions reductions of the project activity "Reduction of N₂O emissions from the new nitric acid plant #5 of Hu-Chems Fine Chemical Corp." (UNFCCC Registration Ref. No. 6637) for the period from 01/09/2015 to 31/03/2016 are fairly stated in the MR (version 1.1).

The data generation, aggregation, recording, calculation and reporting of GHG emission reductions were correctly conducted on the basis of the approved baseline and monitoring methodology ACM0019 (Version 01) and the monitoring plan in the registered PDD.

Hence, KFQ is able to certify that the emission reductions of the project activity "Reduction of N₂O emissions from the new nitric acid plant #5 of Hu-Chems Fine Chemical Corp." during the period from 01/09/2015 to 31/03/2016 are 235,599 tCO₂e.

Signed on behalf of the Korean Foundation for Quality

Signature :



Name : Soon Hong YEOM, Managing Director

Date : 14/06/2016

Appendix 1. Abbreviations

Abbreviations	Full texts
AOR	Ammonia oxidation reactor
CAR	Corrective Action Request
CARBON	Carbon CDM Korea Ltd.
CCP	Carbon Climate Protection GmbH
CDM	Clean Development Mechanism
CER	Certified Emission Reduction(s)
CL	Clarification Request
CMP	COP/MOP Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
CO ₂	Carbon dioxide
CO _{2e}	Carbon dioxide equivalent
DCS	Distributed Control System
DOE	Designated Operational Entity
FAR	Forward Action Request
GC	Gas chromatography
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
Hu-Chems	Hu-Chems Fine Chemical Corp.
IPCC	Intergovernmental Panel on Climate Change
KFQ	Korean Foundation for Quality
KTL	Korean Testing Laboratory
MoC	Modalities of communication
MP	Monitoring Plan
MR	Monitoring Report
NA	Nitric Acid
N ₂ O	Nitrous oxide
PDD	Project Design Document
PP	Project participant
PS	Clean Development Mechanism Project Standard
QMS	Quality Management System
SCR	Selective catalytic reduction
UNFCCC	United Nations Framework Convention on Climate Change
VVS	Clean Development Mechanism Validation and Verification Standard

Appendix 2. Competence of team members and technical reviewers



CERTIFICATE OF COMPETENCE

Name: Jin Seok CHO

Qualification:

	Validation	Verification
-Lead auditor	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
-Auditor	<input type="checkbox"/>	<input type="checkbox"/>
-Technical Expert	<input type="checkbox"/>	<input type="checkbox"/>
-Local Expert	<input type="checkbox"/>	<input type="checkbox"/>

Scopes of Expertise:

Technical Area (TA)

- 1.2 Renewables
- 13.1 Solid waste and wastewater
- 13.2 Manure

He is approved as the qualification above according to the KFQ's procedure of Qualifying and Maintaining of Auditor on 03 March 2015

Sustainability Management Institute
Sang Yeon PARK



CERTIFICATE OF COMPETENCE

Name: Sung Han YOON

Qualification:

	Validation	Verification
-Lead auditor	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
-Auditor	<input type="checkbox"/>	<input type="checkbox"/>
-Technical Expert	<input type="checkbox"/>	<input type="checkbox"/>
-Local Expert	<input type="checkbox"/>	<input type="checkbox"/>

Scopes of Expertise:

Technical Area (TA)

- 1.1 Thermal energy generation
- 1.2 Renewables
- 5.1 Chemical Industry
- 5.2 Caprolactam, nitric and adipic acid
- 11.1 Emissions of fluorinated gases
- 13.1 Solid waste and wastewater
- 13.2 Manure

He is approved as the qualification above according to the KFQ's procedure of Qualifying and Maintaining of Auditor on 03 March 2015.

Sustainability Management Institute
Sang Yeon PARK



CERTIFICATE OF COMPETENCE

Name: Yu Shim JEONG

Qualification:

	Validation	Verification
-Lead auditor	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
-Auditor	<input type="checkbox"/>	<input type="checkbox"/>
-Technical Expert	<input type="checkbox"/>	<input type="checkbox"/>
-Local Expert	<input type="checkbox"/>	<input type="checkbox"/>

Scopes of Expertise:

Technical Area (TA)

- 1.2 Renewables
- 5.1 Chemical Industry
- 5.2 Caprolactam, nitric acid, adipic acid

She is approved as the qualification above according to the KFQ's procedure of Qualifying and Maintaining of Auditor on 03 March 2015

Sustainability Management Institute
Sang Yeon PARK



CERTIFICATE OF COMPETENCE

Name: Sang Yeon PARK

Qualification:

	Validation	Verification
-Lead auditor	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
-Auditor	<input type="checkbox"/>	<input type="checkbox"/>
-Technical Expert	<input type="checkbox"/>	<input type="checkbox"/>
-Local Expert	<input type="checkbox"/>	<input type="checkbox"/>

Scopes of Expertise:

Technical Area (TA)

- 1.2 Renewables
- 3.1 Energy demand
- 5.2 Caprolactam, nitric and adipic acid
- 13.1 Solid waste and wastewater

She is approved as the qualification above according to the KFQ's procedure of Qualifying and Maintaining of Auditor on 03 March 2015

Sustainability Management Institute
Yu Shim JEONG

Appendix 3. Documents reviewed or referenced

No	Author	Title	References to the document	Provider
1	Project participants	Monitoring report: <ul style="list-style-type: none"> Version 1: HUC-6637_MP#04_MR_v1 Version 1.1: HUC-6637_MP#04_MR_v1.1 	From 13/04/2016 From 31/05/2016	Project participants
2	Project participants	CDM Project MS Excel Spreadsheet : Version 1: <ul style="list-style-type: none"> HUC-6637_MP#04_UNFCCC_v1_CONFIDENTIAL 	From 13/04/2016	Project participants
3	Project participants	Shewhart control cards / QAL 3 records	From 01/09/2015 to 31/03/2016	Project participants
4	Project participants	Summary on Shut-downs & Special observations of the monitoring system	From 01/09/2015 to 31/03/2016	Project participants
5	DeltaV / DCS System	Daily monitoring reports (PDF files, CSV files), Daily production reports (PDF files)	From 01/09/2015 to 31/03/2016	Project participants
6	DeltaV / DCS System	Daily event log files (TXT files)	From 01/09/2015 to 31/03/2016	Project participants
7	Project participants	CDM Project Design Document (Version 1.4)	22/06/2012 Published under: https://cdm.unfccc.int/Projects/DB/TUEV-SUED1341912725.05/view	Others
8	TUV SUD	Validation Report for the „Reduction of N2O emissions from the new nitric acid plant #5 of Hu-Chems Fine Chemical Corp.“ project. Report No. 600500803	03/07/2012 Published under: https://cdm.unfccc.int/filestorage/_/9/K2WV4YJ9CDZ80RENPQX6U5301FTGBS.pdf/Validation%20Report.pdf?t=b258bnRoYjlvfDC2EOVmmLUEFozuZgFsLvTM	Others
9	KFQ	Verification/Certification Report for the „Reduction of N2O emissions from the new nitric acid plant #5 of Hu-Chems Fine Chemical Corp.“ for the monitoring period from 01/01/2015 - 31/08/2015 (version 1)	From 14/12/2015 Published under: https://cdm.unfccc.int/Projects/DB/TUEV-SUED1341912725.05/iProcess/KFQ1446457881.9/view	Others
10	Project participants	Equipment list and specifications for all monitoring equipment and analyser - Plant Hu-Chems #5	All from 01/09/2015	Project participants
11	Emerson Process Management	Instruction Manual – NGA 2000 for MLT Analyzer (8 th Edition)	From August 2004	Project participants
12	UHDE GmbH	Performance Test Run protocol - Plant Hu-Chems #5	From 25/02/2013	Project participants
13	Project participants	Calibration gas (test gas) exchange History including all exchanges in the monitoring period	From 31/03/2016	Project participants
14		Calibration gas records		Project

CDM-VCR-FORM

	Airgas	<ul style="list-style-type: none"> Airgas / Certificate low concentration gas / CC458879/ 1% Stability / Expiration on 22/05/2017 	From 22/05/2015	participants
15	EPMK ¹ & Hu-Chems	Service Support Agreements: DeltaV system for EnviNOx® Hu-Chems as well as for Analyser systems for EnviNOx Hu-Chems between Hu-Chems Fine Chemical Corp. and Emerson Process Management Korea Ltd.	From 02/04/2013	Project participants
16	EPMK	Annual service report for nitric acid plant Hu-Chems #5 analyser	From 17/12/2015	Project participants
17	EPMK	Regular service reports: <ul style="list-style-type: none"> Monthly Health Check report September 2015 Monthly Health Check report October 2015 Monthly Health Check report November 2015 Monthly Health Check report December 2015 Monthly Health Check report January 2016 Monthly Health Check report February 2016 Monthly Health Check report March 2016 	From 25/09/2015 From 20/10/2015 From 20/11/2015 From 15/12/2015 From 22/01/2016 From 19/02/2016 From 18/03/2016	Project participants
18	Hu-Chems	CDM Analyser cabinet check lists (Shift) & key list CDM Check sheets of EnviNOx system (daily)	From 01/09/2015 to 31/03/2016	Project participants
19	Hu-Chems	List of spare parts of monitoring system including provisions for re-purchasing.	From 31/03/2016	Project participants
20	TÜV Rheinland Energie und Umwelt GmbH AIRTEC AIRTEC AIRTEC FM Tech KML ² FM Tech TÜV Rheinland Energie und	Calibration records & Certificates (Hu-Chems Plant#5) <ul style="list-style-type: none"> N2O Outlet Analyser (325-AT-5-018) – QAL1 Declaration of Conformity (performed on 05/03/2013) N2O Outlet Analyser (325-AT-5-018) – AIRTEC QAL2 Test Certification (performed on 25 to 28/02/2013, valid until 24/02/2018) N2O Outlet Analyser (325-AT-5-018) – AIRTEC QAL2 Test Certification (performed on 27 to 29/02/2016, valid until 26/02/2021) N2O Outlet Analyser (325-AT-5-018) – AIRTEC AST Test Certification (performed on 16 to 17/09/2015) Nitric acid production flow meter (325-FT-5-609) – Korean Laboratory Accreditation Scheme (KOLAS) Calibration Certificate (performed on 08/05/2015, valid until 07/05/2020) Nitric acid temperature transmitter (325-TT-5-237) – Hu-Chems Calibration Certificate (performed on 07/05/2015, valid until 06/05/2017) AOR Ammonia flow meter (325-FT-5-520) – Korean Laboratory Accreditation Scheme (KOLAS) Calibration Certificate (performed on 08/05/2015, valid until 07/05/2020) Tail gas flow meter (325-FT-5-522) – QAL1 Certification Statement (performed on 05/03/2013, valid until 04/03/2018) 	From 05/03/2013 From 20/07/2013 From 05/04/2016 From 20/10/2015 From 08/05/2015 From 07/05/2015 From 08/05/2015 From 05/03/2013	Project participants

¹ EPMK refers to Emerson Process Management Korea Ltd. and is referred to in that way in the whole Appendix 3

² KML refers to Korea Measurement Technical Laboratory Co. Ltd. and is referred to in that way in the whole Appendix 3

	Umwelt GmbH			
	AIRTEC	<ul style="list-style-type: none"> Tail gas flow meter (325-FT-5-522) AIRTEC - QAL2 Test Certification (performed on 25 to 28/02/2013, valid until 24/02/2018) 	From 20/07/2013	
	AIRTEC	<ul style="list-style-type: none"> Tail gas flow meter (325-FT-5-522) AIRTEC - QAL2 Test Certification (performed on 27 to 29/02/2016, valid until 26/02/2021) 	From 05/04/2016	
	AIRTEC	<ul style="list-style-type: none"> Tail gas flow meter (325-FT-5-522) AIRTEC - AST Test Certification (performed on 16 to 17/09/2015) 	From 20/10/2015	
	AIRTEC	<ul style="list-style-type: none"> Tail gas temperature transmitter (325-TT-5-161) Calibration record (performed on 17/09/2015, valid until 16/09/2017) 	From 20/10/2015	
	KML	<ul style="list-style-type: none"> Tail gas temperature transmitter (325-TT-5-161) Calibration record (performed on 07/05/2015, valid until 06/05/2017) 	From 07/05/2015	
	Hu-Chems	<ul style="list-style-type: none"> Tail gas pressure transmitter (325-PT-5-362) Hu-Chems – Monthly Calibration Certificate 	From 07/08/2015 to 16/03/2016	
21	AIRTEC	<p>AIRTEC QAL2 Test Certification Report (performed on 25 to 28/02/2013), including moisture content measurement records & report</p> <p>AIRTEC QAL2 Test Certification Report (performed on 27 to 29/02/2016), including moisture content measurement records & report</p>	<p>From 20/07/2013</p> <p>From 05/04/2016</p>	Project participants
22	AIRTEC	AIRTEC AST Test Certification Report (performed on 16 to 17/09/2015, including moisture content measurement records & report)	From 20/10/2015	Project participants
23	European Committee for Standardization (CEN)	EN 14181:2014 – Stationary source emissions – Quality assurance of automated measuring systems	From November 2014	Others
24	Hu-Chems	<p>Quality Management System (QMS) Documents</p> <ul style="list-style-type: none"> CDM Operation Management Procedure (HFC-I-EP0448, Rev. 5) CDM Procedures for environment operation management (HFC-I-EP0446, Rev. 4) 	<p>From 12/06/2014</p> <p>From 12/06/2014</p>	Project participants
25	Hu-Chems	Hu-Chems Training records until March 2016 & Training documents	Status from September 2015 to March 2016	Project participants
26	Hu-Chems	<p>Report on environmental regulations (N₂O and NO_x):</p> <ul style="list-style-type: none"> From September 2015 From October 2015 From November 2015 From December 2015 From January 2016 From February 2016 From March 2016 	<p>From 30/09/2015</p> <p>From 31/10/2015</p> <p>From 30/11/2015</p> <p>From 31/12/2015</p> <p>From 31/01/2016</p> <p>From 29/02/2016</p> <p>From 31/03/2016</p>	Project participants
27	Korean Foundation for Quality	<p>ISO 9001:2009 Certificate, valid until 31/08/2017</p> <p>ISO 14001:2009 Certificate, valid until 31/08/2017</p>	<p>From 01/09/2014</p> <p>From 01/09/2014</p>	Project participants
28	Hu-Chems & Korean Foundation for Quality	Internal audit records 2015	From 22/06/2015	Project participants
29	Ministry of	Clean Air Conservation Act of the Republic of Korea	From 02/06/2016	Others

CDM-VCR-FORM

	Environment		Published under: http://www.law.go.kr/%EB%B2%95%EB%A0%B9/%EB%8C%80%EA%B8%B0%ED%99%98%EA%B2%BD%EB%B3%B4%EC%A0%84%EB%B2%95	
30	Ministry of Environment	Framework Act on Low Carbon, Green Growth	From 31/10/2013 Published under: http://www.law.go.kr/lsInfoP.do?lsiSeq=142380#0000	Others
31	Ministry of Environment	Act on the Allocation and Trading of Greenhouse-gas Emission Permits	From 23/03/2013 Published under: http://www.law.go.kr/LSW/lsInfoP.do?lsiSeq=137271#0000	Others
32	Ministry of Knowledge, Economy	Letter, confirming that Hu-Chems plants do not have an obligation from the relevant environmental regulations (Energy & GHG Target Scheme)	From 21/10/2011	Project participants
33	Ministry of Environment	Notification on emissions allocation to Hu-Chems Fine Chemical Corp.	From 01/12/2014	Project participants
34	Project participants	MoC Annex 2	From 11/12/2015 Published under: http://cdm.unfccc.int/Projects/DB/TUEV-SUED1341912725.05/view	Others
35	CDM Executive Board	<p>Methodology ACM0019 "N2O abatement from nitric acid production" (Version 01)</p> <p>Tool - Tool to determine the mass flow of a greenhouse gas in a gaseous stream, version 03.0</p> <p>Standards, Procedures & Checklists</p> <ul style="list-style-type: none"> • Standard – CDM Validation and Verification Standard (Version 09.0) • Standard – CDM Project Standard (Version 09.0) • Standard – Sampling and surveys for CDM project activities and programme of activities (Version 05) • Procedure – Clean Development Mechanism Project Cycle Procedure, version 09.0. • Guideline – Application of materiality in verifications (Version 02.0) • Checklist – Request for issuance and post registration changes: Completeness Checklist (Version 03.0) 	<p>From 03/06/2011 Published under: http://cdm.unfccc.int/methodologies/DB/MNMFNF10VUEOJACEIRX3EHYC9QXGDC</p> <p>27/11/2015 Published under: http://cdm.unfccc.int/Reference/tools/index.html</p> <p>From 20/02/2015</p> <p>From 20/02/2015 From 16/10/2015</p> <p>From 20/02/2015</p> <p>From 20/02/2015</p> <p>From 09/07/2015</p>	Others

CDM-VCR-FORM

		<ul style="list-style-type: none">• Checklist – Request for issuance and post registration changes: Information and Reporting Checklist (Version 02.0)• Form - Monitoring report form (Version 05.1)• Form - Verification and certification report form for CDM project activities (Version 01.0)	From 27/03/2015 From 04/05/2015 From 23/03/2015 All published under: http://cdm.unfccc.int/Reference/index.html	
--	--	---	--	--

Appendix 4. Clarification requests, corrective action requests and forward action requests

Table 1. Remaining FAR from validation and/or previous verification

FAR ID	01	Section no.	E.2	Date: 12/05/2016
Description of FAR				
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 address the concerns and supply relevant additional information;" Hu-Chems 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.				
Project participant response				Date: 31/05/2016
Hu-Chems Environmental team regularly checks, if any regulation on N ₂ O limitation is in place (relevant laws are the Clean Air Conservation Act and the Framework Act on Low Carbon, Green Growth). The relevant Acts show that no regulation of N ₂ O limitation is in place which would restrict the emission of N ₂ O in Hu-Chems nitric acid plant #5. In addition, Korea government has started Korean ETS since 01/01/2015 as per the Act on the Allocation and Trading of Greenhouse-gas Emission Permits (13/03/2013). According to the Act, Hu-Chems Fine Chemical Corp. is designated as allocation entity, and there was a notification received from the Ministry of Environment that CDM projects are exempted from allocation. In conclusion, there is no legal requirement for Hu-Chems to reduce its N ₂ O emissions.				
Documentation provided by project participant				
<ul style="list-style-type: none"> • The Clean Air Conservation Act (from 2013 to 2016 latest version in June 2016) • The Framework Act on Low Carbon, Green Growth (latest version in Dec. 2013) • Act on the Allocation and Trading of Greenhouse-gas Emission Permits (latest version in Mar. 2013) • The confirmation letter from the Ministry of Knowledge and Economy (21/10/2011) • Notification on emissions allocation to Hu-Chems Fine Chemical Corp. by the ministry of environment (01/12/2014) 				
DOE assessment				Date: 01/06/2016
In addition to reviewing the latest reports by the Hu-Chems Environmental team, KFQ checked the relevant Korean environmental regulations including such, which could impact N ₂ O emissions. In April 2010, new Korean regulations became effective (The Framework Act on Low Carbon, Green Growth), introducing the GHG and Energy Target Scheme. Hu-Chems nitric acid plant #5 does not have any target obligation on GHG emissions from this GHG and Energy Target Scheme. This was verified by the confirmation letter from the Ministry of Knowledge and Economy. The verification team have also checked Korean ETS has started since 01/01/2015 as per the Act on the Allocation and Trading of Greenhouse-gas Emission Permits. It was verified that CDM projects are exempted from allocation in Korean ETS through the notification on emissions allocation to Hu-Chems Fine Chemical Corp. by the Ministry of Environment. Thus, it is concluded that Hu-Chems nitric acid plant #5 have no obligation to reduce its N ₂ O emissions, and there is no double counting of emission reductions for Hu-Chems nitric acid plant #5 due to Korean ETS. KFQ confirms, that there are currently no restrictions related to N ₂ O emissions which have impact on the project activity and emission reduction calculations.				

Table 2. CL from this verification

CL ID	01	Section no.	E.3	Date: 12/05/2016
Description of CL				
It is identified that there is a typographical error with regard to the time of relevant observations on 24/09/2015 in the MR.				
Project participant response				Date: 31/05/2016

The typographical error regarding the time of the event on 24/09/2015 was corrected in the MR (v1.1).	
Documentation provided by project participant	
· MR (v1.1)	
DOE assessment	Date: 01/06/2016
The verification team confirms that the typographical error is precisely corrected in the MR (v1.1) and there are no inconsistencies between the MR (v1.1) and the actual situation anymore.	

CL ID	02	Section no.	E.6 & E.7	Date: 12/05/2016
Description of CL				
QAL2 audit is required for the monitoring system based on the European Norm 14181 with regard to the N ₂ O concentration and volume of the tail gas (i.e. 'v _{i,t,db} ' and 'V _{t,db} ') as per the applied methodology (ACM0019_Ver.01). The calibration frequency of QAL2 audit is 3 years according to the internal recommendation of Hu-Chems, and there is a two- day gap between the penultimate QAL2 audit and the latest QAL2 audit. However, EN 14181 (2014) indicates that a QAL2 procedure shall be performed for all measurands: at least every 5 years for every AMS or more frequently if so required by legislation or by the competent authority. Thus, please clarify how the calibration frequency of QAL2 audit is determined and how data regarding the N ₂ O concentration and volume of the tail gas (i.e. 'v _{i,t,db} ' and 'V _{t,db} ') is treated during the two-day gap between the penultimate QAL2 audit and the latest QAL2 audit.				
Project participant response				Date: 31/05/2016
According to the norm EN 14181 a QAL2 needs to be performed at least every 5 years. The PDD refers to EN 14181 and/or supplier's recommendations. Further, no national regulation or directive exists in Korea requesting a shorter QAL2 cycle than EN 14181. Nevertheless, the project participants voluntarily aim a shorter QAL2 cycle of about 3 years. It shall also be noted that the last successful annual surveillance test (AST) was performed according to EN 14181 in September 2015 (= only 5 months before QAL2 in February 2016). Therefore, the project participants are of the opinion that the QAL2 was performed within the requirements of the norm EN 14181 and the supplier's recommendations, and that the data regarding the N ₂ O concentration and volume flow of the tail gas (i.e. parameters "v _{i,t,db} " and "V _{t,db} ") is correctly used during the mentioned two days. However, the project participants acknowledge that the wording in the monitoring report regarding the validity of QAL2 might be misleading and hence it was changed accordingly.				
Documentation provided by project participant				
· MR (v1.1) · EN 14181:2014 – Stationary source emissions – Quality assurance of automated measuring systems				
DOE assessment				Date: 01/06/2016
The verification team confirms that there is no national regulation or directive exists in Korea requesting a shorter QAL 2 cycle than EN 14181, thus it is reasonable for the PPs to determine the calibration frequency of QAL2 audit as 5 years according to EN 14181. It is also confirmed that the QAL2 was performed within the requirements of the norm EN 14181, and the results of QAL2 are correctly applied in the ER calculation.				

Table 3. CAR from this verification

CAR ID	n/a	Section no.	n/a	Date: n/a
Description of CAR				
n/a				
Project participant response				Date: n/a
n/a				
Documentation provided by project participant				
n/a				
DOE assessment				Date: n/a
n/a				

Table 4. FAR from this verification

FAR ID	n/a	Section No.	n/a	Date: n/a
---------------	-----	--------------------	-----	------------------

Description of FAR	
<i>n/a</i>	
Project participant response	Date: <i>n/a</i>
<i>n/a</i>	
Documentation provided by project participant	
<i>n/a</i>	
DOE assessment	Date: <i>n/a</i>
<i>n/a</i>	