



**Verification and certification report form for  
CDM project activities  
(Version 04.0)**

*Complete this form in accordance with the instructions attached at the end of this form.*

**BASIC INFORMATION**

<b>Title and UNFCCC reference number of the project activity</b>	Catalytic N <sub>2</sub> O destruction project at the new nitric acid plant PANNA 4 of Enaex S.A. 5393		
<b>Scale of the project activity</b>	<input checked="" type="checkbox"/> Large-scale <input type="checkbox"/> Small-scale		
<b>Version number of the verification and certification report</b>	3.0		
<b>Completion date of the verification and certification report</b>	05/05/2021		
<b>Monitoring period number and duration of this monitoring period</b>	Monitoring period: 12 <sup>th</sup> 01/12/2019 to 31/12/2020		
<b>Version number of the monitoring report to which this report applies</b>	01.1		
<b>Crediting period of the project activity corresponding to this monitoring period</b>	Type: fixed Start date: 19/12/2011 Length: 10 years		
<b>Project participants</b>	Enaex S.A. Carbon Climate Protection GmbH		
<b>Host Party</b>	Republic of Chile		
<b>Applied methodologies and standardized baselines</b>	ACM0019 v2 (N <sub>2</sub> O Abatement from Nitric Acid Production) No standardized baseline(s) applicable		
<b>Mandatory sectoral scopes</b>	5: Chemical industries		
<b>Conditional sectoral scopes, if applicable</b>	Not Applicable		
<b>Estimated amount of GHG emission reductions or GHG removals for this monitoring duration in the registered PDD</b>	214,798 tCO <sub>2e</sub>		
<b>Certified amount of GHG emission reductions or GHG removals for this monitoring period</b>	Amount before 1 January 2013	Amount from January 2013 until 31 December 2020	Amount from 1 January 2021
	zero	173,080 tCO <sub>2e</sub>	zero
<b>Name and UNFCCC reference number of the DOE</b>	ERM Certification and Verification Services E-0016		

Name, position and signature of the approver  
of the verification and certification report



Melanie Eddis, Partner

**SECTION A. Executive summary**

ERM Certification and Verification Services (ERMCVS) was commissioned by Enaex S.A. (Enaex), to verify and certify the ER reported for the period 01/12/2019 to 31/12/2020 as set out in the monitoring report of the CDM project activity *Catalytic N<sub>2</sub>O destruction project at the new nitric acid plant PANNA 4 of Enaex S.A.*, UNFCCC Reference 5393.

Description of CDM project activity:

The project activity consists in the installation and operations of N<sub>2</sub>O catalyst inserted below the primary catalyst (NH<sub>3</sub> catalyst) in the ammonia oxidation reactor (secondary N<sub>2</sub>O abatement) of PANNA 4 of Enaex located at the Prillex®America Plant at the municipality of Mejillones, Province of Antofagasta, Chile.

Panna 4 was erected in 2010. It produces ammonium nitrate (NH<sub>4</sub>NO<sub>3</sub>), which is used as a raw material for mining and civil explosives used in the mining and construction industries. The nitric acid is also used as raw material for other explosives (PETN and Nitro-glycerine), also used in the same industries previously mentioned. The operation of the CDM project activity started in December 2011.

Project emissions are monitored continuously to determine the ER for each monitoring period. No leakage is expected to occur in projects under this methodology. Requirements regarding the calibration of specific instruments (measuring N<sub>2</sub>O flow and concentration in the gaseous stream) follow the European Standard EN14181. During this monitoring period several operational events (planned or forced shutdowns, safety trips, etc.) occurred. All have been verified and as applicable are discussed in this report (please refer to Appendix 5).

ERM CVS was responsible to provide an independent verification conclusion on the reported greenhouse gas (GHG) ER for the project during the relevant monitoring period. The verification activities included desk review, a virtual site visit<sup>1</sup>, close out of open issues, preparation of reports and technical review. This report sets out the methodology and conclusions of the verification process and the ERM CVS Certification Statement. ERM CVS assessed and verified whether the implementation of the project activity and the steps taken to report ER comply with the CDM criteria and relevant guidance provided by the CMP and the CDM Executive Board.

As set out in the CDM modalities and procedures, verification is the periodic independent review and ex post determination by the Designated Operational Entity (DOE) of the monitored reductions in anthropogenic emissions by sources of greenhouse gases (GHGs) that have occurred as a result of a registered CDM project activity during the verification period. Certification is the written assurance by the DOE that, during a specified time period, a project activity achieved the reductions in anthropogenic emissions by sources of GHGs as verified. The objective of the verification is to establish whether sufficient evidence exists to confirm, to reasonable assurance:

- Whether the project activity has been implemented and is being operated as per the PDD /03/ and that all physical features (technology, project equipment, and monitoring and metering equipment) of the project activity are in place;
- Whether the applied monitoring plan /04/ is in compliance with the relevant approved CDM monitoring methodology;
- Whether the monitoring report /01/ and other supporting documents provided are complete

<sup>1</sup> The Executive Board of the Clean Development Mechanism (CDM), at its 108<sup>th</sup> meeting, agreed to further extend the period in which DOEs may apply alternative measures of validation/verification to mandatory on-site inspections until 30 June 2021. Based on this decision and considering the health and safety risks, ERMCVS did not conduct a site visit.

and verifiable and in accordance with the monitoring plan and applicable CDM requirement;

- Whether the ER as set out in the monitoring report /1/ have been measured, calculated and reported in accordance with the requirements of the monitoring plan /04/, and
- Whether the reported data meet the key principles of data quality and are complete, reliable, consistent, accurate, valid, transparent and conservative.

ERM CVS also assessed whether the monitoring report and other supporting documents provided are complete in accordance with the latest applicable UNFCCC checklists and guidance for documentation required to be submitted with the Request for Issuance.

#### Scope and basis of verification work:

The verification is an independent and objective review and ex-post determination of the monitored reductions in GHG emissions by the DOE. Based on the key project information the verification addresses the implementation and operation of the project activity as set out in the PDD /03/, and the information and reported ER set out in the monitoring report prepared by the project participant (PP) for this monitoring period.

Only verification activities undertaken after the publication of the monitoring report on the UNFCCC CDM website are used as a basis for ERM CVS to conclude the verification and submit a request for issuance of CERs to the CDM EB.

The verification considers both quantitative and qualitative information on ER. The monitoring report is assessed, using a rule based approach, against the principles of accuracy, relevance, credibility, reliability, completeness, consistency, and transparency. Conservativeness is applied throughout the process to ensure that ER are not overstated.

ERM CVS conducts all its work under strict rules to safeguard impartiality and ensure the independence of the verification team. The verification does not provide any consulting or recommendations for the client. However, stated requests for clarifications and/or corrective actions may provide input for improvement of the monitoring activities.

#### Conclusions:

In conclusion, based on the verification activities undertaken, ERM CVS concludes that the project activity is implemented and operated as described in the registered Project Design Document. The GHG ER set out in the monitoring report were found to be appropriately measured and calculated in accordance with the applied monitoring methodology and the monitoring plan. ERM CVS concluded that the reported ER for the monitoring period are fairly stated. Please see section G for the verification opinion and certification statement.

**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/document review	On-site inspection	Interviews	Verification findings
1.	Team Leader	EI	Braulio	Pikman	ERM Brasil	Y	N	Y	Y
2.	Verifier	EI	Correa	Alice	ERM Brasil	Y	N	Y	Y

**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	Li	Huoyun	External
2.	Approver	IR	Eddis	Melanie	ERM CVS London

**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.	Not applicable as consideration of materiality was not considered in the planning of this verification in accordance with the "Guideline: Application of materiality in verifications".		Because this project uses automatic metering/measuring, ERM CVS checked 100% of the calibration information, all data collection and calculation in order to verify the ER number.	Not applicable

**C.2. Consideration of materiality in conducting the verification**

>> In the case of the project activity, an omission, misstatement, or erroneous reporting of information is considered material if it might lead, at an aggregated level, to an overestimation of the total ER or removals achieved by a registered CDM project activity equal to or higher than 0.5 per cent of the ER (project activities achieving a total ER equal to or more than 500,000 tCO<sub>2</sub>e per year). The project uses automatic metering/measuring devices with automatic data extraction and automated calculations. ERM CVS checked 100% of the data associated to calibration, metering systems, all data collection procedures and formulas used in calculations in order to verify the ER number.

**SECTION D. Means of verification****D.1. Desk/document review**

>> A detailed desk review was undertaken prior to the virtual site visit. This included the PDD /03/, the monitoring plan /04/, the validation report /05/, the applied monitoring methodology, previous

verifications reports /06/, relevant external data and reports, project documents, and relevant decisions, clarifications and guidance from the CMP and the CDM Executive Board.

The desk review included:

- A review of the data and information presented to verify completeness and consistency in accordance with relevant CDM requirements;
- A review of the monitoring plan and monitoring methodology, including applicable tools, paying particular attention to the frequency of measurements, quality of metering equipment (including calibration requirements) and the quality assurance and quality control (QA/QC) procedures;
- An evaluation of data management and the QA/QC system in the context of their influence on the generation and reporting of ER, and
- Review of the monitoring report to ensure it is completed as per the standardised format.

## D.2. On-site inspection

This verification was conducted without a site visit corresponding with the decision of the Executive Board of the Clean Development Mechanism (CDM), at its 108<sup>th</sup> meeting, where it agreed to further extend the period in which DOEs may apply alternative measures of validation/verification to mandatory on-site inspections until 30 June 2021. It is noted that for this verification site visit could not be postponed due to the uncertainty around when Covid-19 related travel restrictions will be lifted and when it will be safe for the verification team to visit the project site. Additionally, due to the timescale agreed by ERM CVS in the verification contract and corporate commitments/budgetary issues of ENAEX, it was not possible to postpone indefinitely the verification site visit. Based on this, a decision was made on conducting a virtual site visit as part of the verification process.

Alternative means was to conduct a virtual site visit via videoconference, phone calls and exchange of emails. These actions have been considered sufficient for the purpose of verification with sufficient evidence collected/communicated.

## D.3. Interviews

Interviews were conducted remotely during the virtual site visit on 31 March, 2021

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1.	Diaz	Josefina	ENAEX	31/03/2021	Data extraction/ER calculation/ events occurring during the monitoring period/calibration	Braulio Pikman Alice Correa
2.	Bichler	Sonja	Carbon Austria	31/03/2021	Data extraction/ER calculation/ events occurring during the monitoring period/calibration	Braulio Pikman Alice Correa
3.	Aliaga	Andres	ENAEX – Production & Process	31/03/2021	Events occurring during the monitoring period/calibration	Braulio Pikman Alice Correa
4.	Cristobal	Couple	ENAEX – Production & Process	31/03/2021	Events occurring during the monitoring period/calibration	Braulio Pikman Alice Correa

## D.4. Sampling approach

>> Not applicable

**D.5. Clarification requests (CLs), corrective action requests (CARs) and forward action requests (FARs) raised**

Areas of verification findings	No. of CL	No. of CAR	No. of FAR
Compliance of the monitoring report with the monitoring report form			
Compliance of the project implementation and operation with the registered PDD			
Post-registration changes			
Compliance of the registered monitoring plan with the methodologies including applicable tools and standardized baselines			
Compliance of monitoring activities with the registered monitoring plan			
Compliance with the calibration frequency requirements for measuring instruments		1	
Assessment of data and calculation of ER or net removals			
Assessment of reported sustainable development co-benefits			
Global stakeholder consultation			
Others (please specify):			
<b>Total</b>	0	1	0

**SECTION E. Verification findings**
**E.1. Compliance of the monitoring report with the monitoring report form**

<b>Means of verification</b>	ERM CVS evaluated whether the monitoring report has been prepared in accordance with the latest valid and applicable Monitoring Report Form and correctly presents the status of post registration changes that are relevant to the project activity.
<b>Findings</b>	The final monitoring report was found to be correctly completed according to the latest valid form. The monitoring report was found, through document review, to correctly state the implementation and operational status of the project activity, in accordance with the Guidelines.
<b>Conclusion</b>	ERM CVS confirms that the monitoring report has been appropriately prepared using the applicable monitoring report form that all sections are completed and it complies with the latest valid monitoring report form and the instructions therein for filling out the form. ERM CVS confirms that the monitoring report correctly presents the status of post registration changes. For this project activity there have been no Post Registration Changes during this monitoring period.

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

>> Please refer to Appendix 4 of this report.

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

<b>Means of verification</b>	Based on the review of documentation provided, and interviews, ERM CVS assessed whether all physical features of the project as described in the PDD are in place and that the PP have operated the project in accordance with operational criteria set out in the PDD /03/, and whether any deviation or the proposed or actual changes in the implementation or operation of the project activity comply with the requirements of the Project Standard.
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	<p>During the ERM CVS virtual site visit the verification team:</p> <ul style="list-style-type: none"> <li>• Checked the installed equipment, including the monitoring instruments, their name plates (photos were provided by PPs), and cross-checked them against the PDD and monitoring plan /03/04/ and the monitoring report/01/;</li> <li>• Interviewed the staff responsible for the monitoring and implementation of the project, and</li> <li>• Reviewed the relevant training materials and training records.</li> </ul>
<b>Findings</b>	<p>ERM CVS confirms that:</p> <ul style="list-style-type: none"> <li>▪ the installed capacity and number of units have not changed;</li> <li>▪ no component has been added nor the technology has been extended;</li> <li>▪ the project is still a single site activity, and the scale of the project has not changed.</li> </ul> <p>The operation of the project during the monitoring period is confirmed to be in line with the operational assumptions made in the PDD /03/. During this monitoring period, there were no special events or situations that may impact the applicability of the methodology.</p> <p>ERM CVS confirms that the project activity operates as per the PDD /03/ and consists of a secondary N<sub>2</sub>O abatement, composed of a N<sub>2</sub>O catalyst inserted below the primary catalyst (NH<sub>3</sub> catalyst) in the ammonia oxidation reactor. ERM CVS therefore concluded that the project was implemented and equipment installed as described in the PDD and its monitoring plan /03/04/.</p>
<b>Conclusion</b>	<p>ERM CVS confirms that all physical features of the proposed CDM project activity have been implemented in accordance with the PDD /03/.</p> <p>The project activity is also confirmed to be fully operational in accordance with the PDD /03/.</p> <p>The information provided in the latest version of the monitoring report sections A and B correctly states the implementation and operational status of the project activity.</p> <p>ERM CVS confirms that:</p> <ul style="list-style-type: none"> <li>▪ the installed capacity and number of units have not changed;</li> <li>▪ no component has been added nor the technology has been extended;</li> <li>▪ the project is still a single site activity;</li> <li>▪ the scale of the project has not changed.</li> </ul>

#### **E.4. Post-registration changes**

##### **E.4.1. Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents<sup>2</sup>**

>> Not applicable.

##### **E.4.2. Corrections**

>> Not applicable.

##### **E.4.3. Change to the start date of the crediting period**

>> Not applicable.

<sup>2</sup> Other standards, methodologies, methodological tools and guidelines (to be) applied in accordance with the applied(selected) methodologies are collectively referred to as the other (applied) methodological regulatory documents).



**E.4.4. Inclusion of a monitoring plan**

&gt;&gt; Not applicable.

**E.4.5. Permanent changes from registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines or other methodological regulatory documents**

&gt;&gt; Not applicable.

**E.4.6. Changes to the project design**

&gt;&gt; Not applicable.

**E.4.7. Changes specific to afforestation and reforestation project activities**

&gt;&gt; Not applicable.

**E.5. Compliance of the registered monitoring plan with applied methodologies, applied standardized baselines, and other applied methodological regulatory documents**

<b>Means of verification</b>	The verification team reviewed the monitoring plan /04/ and compared it against the requirements of the applied methodology and the applicable tools.
<b>Findings</b>	<p>ERM CVS confirms that the monitoring plan /04/ includes appropriate provisions for the organisation and management structure, monitoring and reporting procedures, measuring instruments, staff training, QA/QC procedures, and data management to comply with the monitoring methodology. QA/QC procedures include systematic calibration and equipment maintenance, inspections and third party “health checks” by equipment supplier/10/.</p> <p>ERM CVS confirms that monitoring processes for the data and parameters, which are required to be monitored by the methodology, are included in the monitoring plan. The application of the monitoring methodology was found to be appropriate and ERM CVS confirms that the monitoring plan is consistent with the requirements of the approved methodology /8/.</p> <p>The methodology refers to the “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” and to the “Tool to calculate project or leakage CO<sub>2</sub> emissions from fossil fuel combustion” both in its latest version. ERM CVS has confirmed that the referred tools were duly applied in this project activity and no standardized baselines are used according to the applied methodology.</p> <p>If data for either the N<sub>2</sub>O concentration or the volume or mass flow of the tail gas are not available for more than 1/3 of any hour while the plant was in operation, the value for that hour shall be replaced with the maximum value of N<sub>2</sub>O concentration or volume or mass flow of the tail gas observed during the monitoring period. If data for neither the N<sub>2</sub>O concentration nor the volume or mass flow of the tail gas are available for more than 1/3 of any hour while the plant was in operation, the maximum value of mass flow of N<sub>2</sub>O calculated during the monitoring period shall be applied to any such hour. Values observed during five operating hours before and after a plant start-up and shutdown shall not be used for the determination of the maximum values, in line with the applied methodology and the “Tool to determine the mass flow of a greenhouse gas in a gaseous stream”.</p> <p>ERM CVS did not note any relevant monitoring aspects that are not specified in the methodology, which may enhance the level of accuracy and completeness of the revised monitoring plan.</p>
<b>Conclusion</b>	ERM CVS confirms that the monitoring plan /04/ is in accordance with the approved methodology /08/ applied by the CDM project activity. No standardized baselines are used in the project activity according to the applied methodology.

**E.6. Compliance of monitoring activities with the registered monitoring plan****E.6.1. Data and parameters fixed ex ante or at renewal of crediting period**

<b>Means of verification</b>	Data and parameters fixed ex-ante or at the renewal of the crediting period as listed in the monitoring report have been crosschecked and reviewed – as applicable – against the monitoring plan in the PDD as well as against the applied methodology and other relevant CDM related documentation. Therefore, the verification team evaluated the status of data and parameters that were determined at registration and not monitored during the monitoring period, including default values and factors, and confirmed whether they were correctly presented in Section D.1 of the monitoring report /01/ and applied correctly in the ER calculations spreadsheet /02/.
<b>Findings</b>	<p>The values of the parameters fixed ex-ante valid for this monitoring period as listed in chapter B.6.2 of the PDD are:</p> <ul style="list-style-type: none"> <li>• Baseline N<sub>2</sub>O emission factor for nitric acid production in year 2019 and 2020 (related to 100 per cent pure acid) respectively: 2.70 kg N<sub>2</sub>O/t HNO<sub>3</sub> and 2.50 kg N<sub>2</sub>O/t HNO<sub>3</sub></li> <li>• Global warming potential of N<sub>2</sub>O valid for the commitment period: 298</li> <li>• Universal ideal gases constant: 8,314 Pa.m<sup>3</sup>/kmol.K</li> <li>• Molecular mass of greenhouse gas i: 44.02 kg/kmol (N<sub>2</sub>O)</li> </ul> <p>The parameters were correctly presented in the monitoring report /01/ in line with the PDD. They have been applied appropriately in the ER calculation spreadsheet /02/.</p>
<b>Conclusion</b>	ERM CVS confirms that the parameters were correctly presented in the monitoring report /01/ and applied appropriately in the ER calculation spreadsheet /02/. All values are in compliance with relevant documentation such as the PDD and monitoring plan as well as the applied methodology, applied tools and other CDM related documentation, where applicable. Furthermore, ERM CVS confirms that the monitoring activities comply with the registered monitoring plan.

**E.6.2. Data and parameters monitored**

<b>Means of verification</b>	<p>ERM CVS assessed the information flow and data collection system of all major components of the information flow and data collection system as well as related documentation. Interviews with relevant staff were held in order to understand how the monitoring process is implemented, roles and responsibilities, and test staff competency. During the ERM CVS virtual site visit the verification team:</p> <ul style="list-style-type: none"> <li>• Obtained information and checked the installed equipment, including the monitoring instruments, their name plates, and cross-checked them against the PDD and monitoring plan /03/04/ and the monitoring report /01/;</li> <li>• Interviewed the staff responsible for the monitoring and implementation of the project, and</li> <li>• Reviewed the relevant training materials and training records.</li> <li>• Reviewed metering equipment specifications and calibration records, where relevant.</li> </ul>
<b>Findings</b>	<p>ERM CVS's detailed findings for each monitored parameter are presented in Appendix 5.</p> <p>The parameter <i>Volumetric flow of the gaseous stream in time interval t on a dry basis</i> is measured by a multiple pressure differentials type equipment, which allows continuous and real time measurements of the N<sub>2</sub>O volumetric flow. The parameter <i>Volumetric fraction of greenhouse gas i in a time interval t on a dry basis</i> is measured by a non-dispersive infrared photometry (NDIR). Both equipment are found to be in line with the description provided in the PDD. The N<sub>2</sub>O outlet data for mass flow/volume and concentration of tail gas are recalculated using the 2016 QAL 2 /25/26/ correction factors, in line with the requirements of the methodology and EN14181. The AST conducted during 09/01/2019 to 10/01/2019) /25/ and again from 05/03/2020 to 06/03/2020 /25/ confirmed that the last QAL 2</p>

	<p>assessment /26/ is still valid with no need for a new complete QAL 2 campaign during this monitoring period.</p> <p>All CDM project related instruments and equipment are adjusted and/or calibrated according to a maintenance program based on industry standards and supplier specifications. This has been verified with the calibration planning and calibration certificates provided by PP. PP has also established a set of back up plans and emergency procedures for monitoring system to ensure availability of data what includes a contract with Emerson Process Management to execute onsite periodic "health checks" /10/. During this monitoring period health checks were done remotely with the Emerson specialist providing advice by telephone and video conference since a site visit was not possible due to COVID-19 travel restrictions. The operating and maintenance personnel are trained /22/.</p> <p>Information flow and data collection procedures associated to the CDM Project consist of monitoring instrument transmitters converting the primary sensing signal (resistance, voltage, infrared light etc.) in a signal that is hardwired transmitted to I/O cards (input cards) where they are collected by DeltaV processor system. These digital values are made available via fiber optics to the DeltaV Continuous Historian Server (CHS). The CHS stores continually the information of field process variables, calculated variables or normalized variables. From the CHS database the Excel Macros transfer the data for the internal reports. Project parameters are exported from the digitally available daily reports to an excel book for calculation of baseline emissions, project emissions and ER according to formulae as required by the applicable methodology.</p> <p>The latest report /10/, indicated that DeltaV is working within the recommended parameters.</p> <p>ERM CVS has checked each and every one of these shutdowns and data generation during this period and its usage in the ER Calculation spread sheet.</p>
<b>Conclusion</b>	<p>ERM CVS confirms that the all monitoring parameters stated in the monitoring plan /04/, the applied methodology /08/ and the relevant CDM EB decisions have been appropriately monitored. ERM CVS confirms that the monitoring activities comply with the registered monitoring plan. Please see Appendix 5 for further details.</p>

### E.6.3. Implementation of sampling plan

<b>Means of verification</b>	Not applicable.
<b>Findings</b>	Not applicable.
<b>Conclusion</b>	Not applicable.

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

<b>Means of verification</b>	<p>ERM CVS evaluated whether the calibration of measuring equipment that can have an impact on the claimed ER was conducted at the frequency specified in the applied monitoring methodology /08/ and/or the monitoring plan /04/. ERM CVS reviewed the status of the equipment on site, and reviewed documented technical specifications and calibration certificates where applicable. Please refer to Appendix 5 for details.</p>
<b>Findings</b>	<p>If the calibration frequency deviates from the prescribed frequency, one of the two situations is applied:</p> <ol style="list-style-type: none"> <li>Calibration has been delayed and the calibration has already been implemented (i.e. the results of delayed calibration are available). In this case, the PP must adopt a conservative approach in the calculation of ER by either: <ol style="list-style-type: none"> <li>If the results of the delayed calibration do not show any errors in the measuring equipment, or if the error is smaller than the maximum permissible error - Applying the maximum permissible error of the instrument to the measured values taken during the period between the scheduled date of calibration and the actual date of calibration or</li> <li>If the error is beyond the maximum permissible error of the measuring equipment - Applying the error identified in the delayed calibration test,</li> </ol> </li> </ol>

- b) Calibration has been delayed and the results are not available at the time of verification. In this case, ERM CVS will request the PP to conduct the required calibration and then apply a conservative approach as set out in (a) above.

If ERM CVS determines that it is not possible for the PP to conduct the calibration at a frequency specified by either the applied methodology, guidance provided by the UNFCCC Executive Board, and/or the monitoring plan due to reasons beyond the control of PP, the requirements for post registration changes in section are followed (see section 6).

In cases where neither the monitoring methodology nor the monitoring plan specify any requirements for calibration frequency for measuring equipment, ERM CVS determines whether the equipment is calibrated either in accordance with the specifications of the local/national standards, or as per the manufacturer's specification or, if neither are available, appropriate international standards may be used.

The status of instrument calibration for this monitoring period is set in Appendix 5 below. In line with the requirements of EN14181 a QAL2 /26/ was conducted in November 2016 and is valid for 5 years. An AST/25/ has been done in January 2019 and in March 2020. The 2019 and 2020 ASTs confirmed the calibration function of the 2016 QAL2, therefore all readings were considered to be correctly recalculated using the correction factors from the 2016 QAL2. Although an AST is not considered as a calibration acc. to EN14181, but due to the delay in the execution of the AST a CAR was raised associated to the need to apply the calibration delay guidance. This CAR was duly closed by PP.

The recent AST confirmed that monitoring devices are functional without defects and variability criteria are fulfilled.

Applicable QAL2 Correction factors for this monitoring period are:

$V_{t,db}$ -Volumetric flow of the gaseous stream in time interval $t$ on a dry basis (Nm <sup>3</sup> dry gas)	0,000	QAL2 2016 intercept a)
	0,969	QAL2 2016 slope b)
$V_{i,t,db}$ -Volumetric fraction of greenhouse gas $i$ in the gaseous stream in a time interval $t$ on a dry basis (Nm <sup>3</sup> gas $i$ / Nm <sup>3</sup> dry gas) - RANGE 1	-50,00	AMS parameter, a)
	12,50	AMS parameter, b)
	-49,90	QAL2 2016 parameter, a)
	12,47	QAL2 2016 parameter, b)
$V_{i,t,db}$ -Volumetric fraction of greenhouse gas $i$ in the gaseous stream in a time interval $t$ on a dry basis (Nm <sup>3</sup> gas $i$ / Nm <sup>3</sup> dry gas) - RANGE 2	-500,00	AMS parameter, a)
	125,00	AMS parameter, b)
	-498,80	QAL2 2016 parameter, a)
	124,69	QAL2 2016 parameter, b)

QAL3 has been duly implemented by PP consisting of zero and span checks and adjustment as necessary. According to the latest AST/25/, QAL3 meets the demand of EN14181.

The calibration requirements for the current period were checked with the reference documents (PDD, international standards and manufacturer's information, etc.) and found to be in compliance with the guideline for assessing compliance with the calibration requirements including the application of calibration delay guidance.

Calibration delay during this period occurred associated to the equipment with:

- TAG TT-45093 - tail gas temperature transmitter;

	<ul style="list-style-type: none"> <li>• TAGs PT-45095 and PT-45091, both tail gas pressure transmitters.</li> </ul> <p>In all cases calibration delay guidance has been duly applied by PP in the initial version of the MR.</p>
<b>Conclusion</b>	ERM CVS confirms that the calibration of the measuring equipment was conducted at the specified frequency (in the applied monitoring methodology and/or the approved monitoring plan), and where applicable, calibration delay guidance has been duly applied.

## 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

<b>Means of verification</b>	<p>ERM CVS evaluated the data and calculations of baseline emissions of the project activity by the application of the selected approved methodology.</p> <p>In conducting this evaluation, the verification team evaluated whether:</p> <ul style="list-style-type: none"> <li>• A complete set of data for the monitoring period was available, <ul style="list-style-type: none"> <li>○ If only partial data are found to be available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan (or approved revised monitoring plan), ERM CVS will raise a CAR for the PP to comply with the requirements of the Project standard or submit a request for deviation prior to submitting the request for issuance,</li> </ul> </li> <li>• Information provided in the monitoring report has been cross checked with other sources such as log books (DeltaV raw data), laboratory analysis;</li> <li>• Calculations of baseline emissions have been carried out in accordance with the formulae and methods described in the monitoring plan and the applied methodology;</li> <li>• Any assumptions used in the emission calculations have been justified;</li> <li>• Appropriate emission factors, IPCC default factors and other reference values have been correctly applied.</li> </ul>
<b>Findings</b>	<p>The baseline emissions achieved in this monitoring period have been calculated to be 221,508 tCO<sub>2</sub>e.</p> <p>Baseline emissions have been calculated in accordance with the monitoring plan and the applied methodology, and it was determined that the data processing and ER calculation resulted in real and measurable ER. Where there was any unavailability of data, conservative assumptions have been made in line with the methodology. All assumptions, emission factors and default values have been justified and the information has been cross checked with other sources.</p>
<b>Conclusion</b>	<p>ERM CVS confirms that the calculation of baseline emissions as set out in the ER calculation spreadsheet /02/ has been based on appropriate methods and formulae and that the calculation of baseline emissions during the monitoring period is accurate and in line with the monitoring plan and methodology.</p> <p>ERM CVS confirms that the ER in the calculation spreadsheet /02/ and all assumptions, emission factors and default factors have been appropriately justified and applied.</p> <p>ERM CVS confirms that all data and formulae have been correct.</p>

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

<b>Means of verification</b>	<p>ERM CVS evaluated the data and calculations of project emissions resulting from the project activity by the application of the selected approved methodology.</p> <p>In conducting this evaluation, the verification team evaluated whether:</p> <ul style="list-style-type: none"> <li>• A complete set of data for the monitoring period was available,</li> </ul>
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	<ul style="list-style-type: none"> <li>○ If only partial data are found to be available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan (or approved revised monitoring plan), ERM CVS will raise a CAR for the PP to comply with the requirements of the Project standard or submit a request for deviation prior to submitting the request for issuance,</li> <li>• Information provided in the monitoring report has been cross checked with other sources such as log books (DeltaV raw data), laboratory analysis;</li> <li>• Calculations of project activity emissions have been carried out in accordance with the formulae and methods described in the monitoring plan and the applied methodology;</li> <li>• Any assumptions used in the emission calculations have been justified;</li> <li>• Appropriate emission factors, IPCC default factors and other reference values have been correctly applied.</li> </ul>
<b>Findings</b>	<p>The project emissions achieved in this monitoring period have been calculated to be 48,428 tCO<sub>2</sub>e.</p> <p>Project emissions have been calculated conservatively, and it was determined that the data processing and ER calculation resulted in real and measurable ER. Where there was any unavailability of data, conservative assumptions have been made. All assumptions, emission factors and default values have been justified and the information has been cross checked with other sources as applicable.</p>
<b>Conclusion</b>	<p>ERM CVS confirms that the ER calculation spreadsheet /02/ and all assumptions, emission factors and default factors that have been applied have been appropriately justified and applied.</p> <p>ERM CVS confirms that all data and formulae in the final documents have been correct.</p>

### E.8.3. Calculation of leakage GHG emissions

<b>Means of verification</b>	No leakage is considered under the Methodology.
<b>Findings</b>	No leakage is considered under the Methodology.
<b>Conclusion</b>	No leakage is considered under the Methodology.

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

<b>Means of verification</b>	<p>ERM CVS evaluated the data and calculations of ER resulting from the project activity by the application of the selected approved methodology.</p> <p>In conducting this evaluation, the verification team evaluated whether:</p> <ul style="list-style-type: none"> <li>• A complete set of data for the monitoring period was available,</li> <li>• Information provided in the monitoring report has been cross checked with other sources such as log books (DeltaV raw data), laboratory analysis;</li> <li>• Calculations of ER have been carried out in accordance with the formulae and methods described in the monitoring plan and the applied methodology, or conservative assumptions have been applied;</li> <li>• Any assumptions used in the ER calculations have been justified;</li> <li>• Appropriate emission factors, IPCC default factors and other reference values have been correctly applied.</li> </ul>
<b>Findings</b>	<p>The GHG emission reductions achieved in this monitoring period have been calculated to be 173,080 tCO<sub>2</sub>e.</p>

	<p>PP used an excel spreadsheet which presents in a transparent manner the electronic recorded data and formulae used in the calculation. The signals generated by the measuring instruments are acquired and logged electronically by DeltaV processor system. From this raw database the Excel Macros transfer the data for the internal reports. Project parameters are exported from the digitally available daily reports to the excel book for calculation of baseline emissions, project emissions and ER according to formulae as required by the applicable methodology. Actual ER calculation uses values from such spreadsheet.</p> <p>ER have been calculated in accordance with the monitoring plan and the applied methodology, and conservative assumptions have been used where data was unavailable. It was determined that the data processing and ER calculation resulted in real and measurable ER. Where there was any unavailability of data, conservative assumptions have been made in line with the methodology. All assumptions, emission factors and default values have been justified and the information has been cross checked with other sources.</p>
<b>Conclusion</b>	ERM CVS confirms that the calculation of emission reduction as set out in the ER calculation spreadsheet /02/ is in line with the monitoring plan, methodology and relevant tools.

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

<b>Means of verification</b>	ERM CVS reviewed the monitoring report to confirm that the PP has compared the ER with the number of ER estimated in the PDD for an equivalent number of days as the monitoring period.
<b>Findings</b>	<p>ERM CVS has reviewed the ER stated in the monitoring report and confirms that the PP has presented a clear comparison of the ER during the monitoring period with the prediction in the PDD.</p> <p>The ER for this monitoring period predicted in the registered PDD have been correctly calculated as 214,798 tCO<sub>2</sub>e.</p> <p>The total ER for the period of 173,080 tCO<sub>2</sub>e were therefore found to be lower than had been predicted in the PDD.</p>
<b>Conclusion</b>	ERM CVS confirms that the PP has appropriately presented the ER for the monitoring period and these were lower than predicted.

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

<b>Means of verification</b>	ERM CVS reviewed the monitoring report to confirm that the PP has compared the ER with the number of ER estimated in the PDD for an equivalent number of days as the monitoring period. The total ER for the period were therefore found to be lower than had been predicted in the PDD.
<b>Findings</b>	As the ER are less than the estimation in the PDD for an equivalent number of days, no further explanation is required.
<b>Conclusion</b>	ERM CVS confirms that the PP has appropriately presented the ER for the monitoring period and these were lower than the prediction in the PDD.

#### 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

<b>Means of verification</b>	ERM CVS reviewed the monitoring report to check whether the PP has correctly presented the actual ER or net anthropogenic GHG removals by sinks during the first commitment period and the period from 1 January 2013 onwards.
<b>Findings</b>	All ER during this monitoring period have occurred during the second commitment period, after 31 December 2012 and before 1 January 2021.
<b>Conclusion</b>	ERM CVS confirms that the PP has correctly presented the actual ER or net anthropogenic GHG removals by sinks (from 1 January 2013 onwards).

#### E.9. Assessment of reported sustainable development co-benefits

<b>Means of verification</b>	N/A
<b>Findings</b>	N/A
<b>Conclusion</b>	N/A

**E.10. Global stakeholder consultation**

<b>Means of verification</b>	N/A.
<b>Findings</b>	N/A
<b>Conclusion</b>	N/A

**SECTION F. Internal quality control**

>> The verification activities and content of the report are subject to a review by an independent technical reviewer. The role of the Technical Reviewer is to provide oversight that all procedures have been followed by the verification team and all conclusions justified and supported by evidence. The Technical Reviewer will either accept or reject the recommendations made by the verification team.

**SECTION G. Verification opinion**

>> ERM CVS based its verification work on:

- the approved methodology applied in the project design document (PDD);
- the registered PDD;
- previous verification reports;
- the CDM Validation and Verification Standard for project activities (VVS) v2.0;
- the CDM Project Standard for project activities (PS) and Project Cycle Procedure for project activities (PCP), both v.2.0;
- UNFCCC criteria referred to in the Kyoto Protocol criteria and the CDM modalities and procedures as agreed in the Bonn Agreement and the Marrakech Accords;
- Relevant decisions, guidance and clarifications of the CMP and CDM Executive Board and any other information and references relevant to the project activities' reported ER.

Based on the verification activities undertaken, ERM CVS concludes that the project activity is implemented and operated as described in the registered Project Design Document.

The GHG ER set out in the monitoring report version v.01.1 dated 07/04/2021 were found to be appropriately measured and calculated in accordance with the applied methodology ACM0019 v2 (N<sub>2</sub>O Abatement from Nitric Acid Production) and the monitoring plan set out in the PDD, v.1.4, dating from 17/09/2014.


Based on the verification activities undertaken, ERM CVS concludes that the reported ER for the monitoring period 01/12/2019 to 31/12/2020 are fairly stated.

**SECTION H. Certification statement**

>>

<b>Basis of verification</b>	<p>ERM CVS based its verification work on:</p> <ul style="list-style-type: none"> <li>▪ the approved methodology applied in the PDD;</li> <li>▪ the registered PDD;</li> <li>▪ previous verification reports;</li> <li>▪ the CDM Validation and Verification Standard (VVS) for project activities V2.0,</li> <li>▪ the CDM Project Standard for project activities (PS) and Project Cycle Procedure (PCP) for project activities, both v.2.0;</li> <li>▪ UNFCCC criteria referred to in the Kyoto Protocol criteria and the CDM modalities and procedures as agreed in the Bonn Agreement and the Marrakech Accords;</li> <li>▪ Relevant decisions, guidance and clarifications of the CMP and CDM Executive Board and any other information and references relevant to the project activity's reported emission reductions;</li> <li>▪ Relevant guidance and clarification of the Executive Board applicable to</li> </ul>
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	this project.	
<b>Responsibilities of ERM CVS</b>	ERM CVS is responsible to provide an independent verification conclusion on the reported greenhouse gas (GHG) emission reductions for the Project Activity during the relevant monitoring period. The verification activities included desk review, virtual site visit, close out of open issues, preparation of report and technical review.	
<b>Responsibilities of Project Participants</b>	The Project Participants (PPs) are responsible for the preparation of the information and GHG emissions data and the reported GHG emissions reductions of the Project Activity on the basis set out within the applicable monitoring plan.	
<b>ERM CVS Opinion</b>	Based on the verification activities undertaken, ERM CVS concludes that the reported ER for the monitoring period 01/12/2019 to 31/12/2020 are fairly stated. Please see section G above for the detailed verification opinion.	
<b>Total GHG emission reductions certified</b>	The total GHG emission reductions certified for this monitoring period are: 173,080 tCO <sub>2</sub> e	
<b>Lead Verifier Name: Braulio Pikman</b>	Signature 	
<b>Technical Reviewer Name: Huoyun Li</b>	Signature 	
<b>Approved by</b>	Signature 	
<b>Name: Melanie Eddis, Partner</b>		
<b>Date: 5<sup>th</sup> May 2021</b>		

## Appendix 1. Abbreviations

Abbreviations	Full texts
AMS	Automated Monitoring System
AOR	Ammonia Oxidation Reactor
AST	Annual Surveillance Test
CHS	Continuous Historian Server
DCS	Distributed Control System
ER	Emission Reductions
NA	Nitric Acid
N/A	Not Applicable
PP	Project Participants
QAL1/2/3	Quality Assurance Level

## Appendix 2. Competence of team members and technical reviewers

**Alice Correa** has been working in the Climate Change field since 2010 and has more than and 20 years of professional experience in the environmental area. She has been involved in environmental audits and is experienced in developing documents and management system compatible with ISO 14001, OSHAS 18001, Ecuador Principles among others. She has conducted more than 100 projects associated to environmental audits/assessments for companies in diverse business sectors including chemical industries and has developed of GHG inventory for tobacco industry, which included the agricultural and processing activities. She has training as Lead Assessor for Mergers & Acquisitions, Auditing, Foundation Course in Environmental Auditing (EARA registered) and Advanced Environmental Management System Auditor. She is a civil engineer and has a Ph.D. in Engineering from the University of São Paulo and M.Sc. Environmental Sanitation (Chemical Engineering) from the University of Gent, Belgium.

**Braulio Pikman** has over 25 years of experience in GHG, energy and air quality related initiatives. He has extensive experience with the oil and gas and energy sectors. He is an expert in thermal measurements, combustion, energy efficiency, Climate Change, CDM Methodologies related to adipic acid, nitric acid and caprolactam production and EN 14181 uses. He has coordinated the Thermal Measurements Laboratory of the Technological Research Institute of Sao Paulo for 10 years, working with Combustion & Gasification Experimental Diagnostics, Air Emissions Monitoring & Control, development of instrumentation for measurements in flames and Energy Conservation Projects to the Oil & Gas Sector, Petrochemical and also Pulp & Paper. He has been responsible for the energy conservation program of the National Petroleum Agency of Brazil from 2000 to 2002 regarding the industrial and Transportation Sectors. Finally he is a member of the Methodological Panel of the United Nations Framework Convention on Climate Change since June 2005.

**Huoyun Li** is a thermodynamic engineer and chartered accountant. She has eight years work experience in the power sector in China. Since 2006 she has worked in the carbon market, with project developers and then with ERM CVS. Her previous experience in CDM includes screening and due diligence of Carbon projects, investment appraisal, internal audit and risk management of CDM projects. She has managed carbon projects through the project design document (PDD) development, validation, registration and verification stages. She also has conducted technical review of CDM documentation during validation and verification stages. The sectors she was involved in include: Catalytic reduction of N<sub>2</sub>O in HNO<sub>3</sub> plants, hydroelectricity, wind energy and solar energy, landfill gas, and coal mine methane. Huoyun Li graduated from Zhejiang University in China with a degree of BSc in Engineering (major in Energy). She also has a degree of BSc (Hons) in Applied Accounting from Oxford Brookes University, UK. Huoyun has completed the ERM CVS CDM validation and verification training course.

### Appendix 3. Documents reviewed or referenced

No.	Author	Title	References to the document	Provider
1	PP	<p><b>Monitoring Report</b> for “Catalytic N<sub>2</sub>O destruction project at the new nitric acid plant PANNA 4 of Enaex S.A.” (UNFCCC #5393),</p> <p>PANNA 4 of Enaex S.A. – 12<sup>th</sup> Monitoring Report v01.0 (made available for public consultation)</p> <p>PANNA 4 of Enaex S.A. – 12<sup>th</sup> Monitoring Report v01.1 (final)</p>	<p>04/03/2021</p> <p>07/04/2021</p>	PP
2	PP	<p><b>ER Calculation spread sheet</b></p> <p>PANNA 4 of Enaex S.A. – 12<sup>th</sup> ER Calculation spreadsheet version 1.0 (file: 5393_MP12_ER Calc v1.0_confidential)</p> <p>PANNA 4 of Enaex S.A. – 12<sup>th</sup> ER Calculation spreadsheet version 1.1 (file: 5393_MP12_ER Calc v1.1_confidential)</p>	-	PP
3	PP	<p><b>Project Design Document</b></p> <p>Registered Project Design Document: “Catalytic N<sub>2</sub>O destruction project at the new nitric acid plant PANNA 4 of Enaex S.A.” – v1.4 dated 17/09/2014</p>	Available at <b>UNFCCC website</b>	UNFCCC
4	PP	<p><b>Monitoring Plan</b></p> <p>Registered Project Design Document: “Catalytic N<sub>2</sub>O destruction project at the new nitric acid plant PANNA 4 of Enaex S.A.” – v1.4 dated 17/09/2014 (monitoring plan in section B.7)</p>	Available at <b>UNFCCC website</b>	UNFCCC
5	TUV Nord	<p><b>Validation Report</b></p> <p>Validation report prepared by TUV Nord for Catalytic N<sub>2</sub>O destruction project at the new nitric acid plant PANNA 4 of Enaex S.A. rev 0.1 dating 04/10/2011</p>	Available at <b>UNFCCC website</b>	UNFCCC
6	TUV Sud	<p><b>Previous Verification Reports associated to the second crediting period:</b></p> <p>Reports issued by TUV Sud for monitoring period #01 through # 08</p>	Available at <b>UNFCCC website</b>	UNFCCC

		Reports issued by ERM CVS for monitoring period #9 to 11		
7	UNFCCC	<b>Project view page on the UNFCCC website</b>  <a href="http://cdm.unfccc.int/Projects/DB/RWTUV1320421146.84/view">http://cdm.unfccc.int/Projects/DB/RWTUV1320421146.84/view</a>	-	UNFCCC
8	UNFCCC	<b>Approved Methodology and methodological tools applied for the project:</b>  ACM0019 v2 - N2O Abatement from Nitric Acid Production  “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” in its latest version  “Tool to calculate project or leakage CO2 emissions from fossil fuel combustion” in its latest version	Available at <b>UNFCCC website</b>	UNFCCC
9	UNFCCC	CDM project Standard for project activities, version 02.0  and  CDM validation and verification standard for project activities, version 02.0	Available at <b>UNFCCC website</b>	UNFCCC
10	EMERSON	Emerson onsite health checks reports (DELTA V_ Diagnostico En Sition Panna4 (14 a 18 oct 2019) and Delda V_Reporte técnico de servicio (oct 2019)		PP
11	PP	Mantenimiento de Instrumentos críticos para Proyecto de Abatimiento de N <sub>2</sub> O ( <i>Procedure on the maintainance of critical instruments for N2O abatement project</i> )		PP
12	Endress + Hauser and h&d	Acid Production Flow Transmitter /coriolis ( <b>FT-45026 and TT-45050</b> ) calibration reports		
13	Endress + Hauser	Acid Production Flow Transmitter ( <b>FT-45026 and TT-45050</b> ) – equipment specifications		PP
14	ENAEX	AOR Temperature Transmitter ( <b>TT-45030A, TT-45030B and TT-45030C</b> ) calibration reports		
15	WiKA	AOR Temperature Transmitter ( <b>TT-45030A, TT-45030B And TT-45030C</b> ) – Acceptance test certificate		PP
16	PP	<b>Production records:</b> HNO3 Production data		PP

17	Durag	Differential pressure transmitter ( <b>FT-45092</b> )– equipment manual		PP
18	Emerson Process Management	Non-dispersive infrared photometry for N <sub>2</sub> O ( <b>AT-45094C</b> ) specifications		PP
19	ENAEX	Tail gas temperature transmitter ( <b>TT-45093</b> ) calibration reports		PP
20	Rosemount	Tail gas temperature transmitter ( <b>TT-45093</b> ) calibration reports		PP
21	ENAEX	Capacitive Differential pressure transmitter ( <b>PT-45091</b> )		PP
22	ENAEX	Training records: -SC Training -On-site operation Training - Analyzer and DeltaV training		
23	ENAEX	Capacitive Barometric pressure transmitter ( <b>PT-45095</b> )		PP
24	ENAEX	Programa de Calibración Bono Carbono PAN_4 2020 ( Carbon credit Panna 4 calibartion Program)		PP
25	Airtec	AST Report 2019 (FILE 18-262_ENAEX AST report 2018_Panna 4_20180306.pdf)  AST Report 2020 (File 20-005 ENAEX AST report 2020_Panna 4_26082020.pdf)		PP
26	Airtec	QAL 2 report 2016 (file 16-261_Panna 4 -22.02.2017_FINAL.pdf) - test dating from 17/11/2016 to 19/11/2016)		PP
27	ERM CVS	<b>Print screens from Virtual Verification</b>  File: Print Screen Opening meeting	-	ERM CVS
28	ENAEX	Photos	-	ENAEX

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

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

<b>FAR ID</b>	01	<b>Section No.</b>	D.2	<b>Date:</b> 29/01/2020
<b>Description of FAR</b>				
<i>PP to register and include as part of the project documentation, a formal cross check of nitric acid production values.</i>				
<b>Project participant response</b>				<b>Date:</b> 07/04/2021
<i>PPs have elaborated a cross check of nitric acid production. The source of this check is the production report published in ENAEX's intranet. In this report the "Ammonia Consumption Rate" (ammonia to nitric acid) with its standard value due the mass balance of the reaction is given. If this ratio is also accomplished by the data given as per the values from DCS, it means that the amount of nitric acid produced matches considering the amount of ammonia consumed. This cross check is done once per MP.</i>				
<b>Documentation provided by project participant</b>				
<i>HNO3 Prod Crosscheck_Ammonia Consumption Ratio.pdf</i>				
<b>DOE assessment</b>				<b>Date:</b> 08/04/2021
<i>DOE revised the procedure implemented by PP and checked the ammonia consumption ratios reported by ENAEX (information available online that demonstrates several production performance indicators). For Panna 4 the ammonia consumed by the plant during this monitoring period is consistent with the nitric acid production reported. The implementation of this crosscheck will add transparency to the CDM project.</i>				
<i>FAR01 is closed.</i>				

<b>FAR ID</b>	02	<b>Section No.</b>	N/A	<b>Date:</b> 29/01/2020
<b>Description of FAR</b>				
<i>Project instruments should have physical TAGs in place and well maintained in order to permit an easy and fast identification of the project equipment.</i>				
<b>Project participant response</b>				<b>Date:</b> 07/04/2021
<i>The PPs replaced the old physical TAGs by new ones in order to allow unique identification of each CDM relevant instrument.</i>				
<div> </div> <p>E.g.:</p>				
<b>Documentation provided by project participant</b>				
<i>Photography of equipment and their TAGs.</i>				
<b>DOE assessment</b>				<b>Date:</b> 08/04/2021
<i>PP has provided a set of photographic evidence that demonstrated that new and clear TAGs have been placed at each project equipment.</i>				
<i>FAR02 is closed.</i>				

<b>FAR ID</b>	03	<b>Section No.</b>	D.2	<b>Date:</b> 29/01/2020
<b>Description of FAR</b>				

PP to register and include as part of the project documentation a cross check of certificates of the standard gas of the AMS per cylinder.

**Project participant response****Date:** 07/04/2021

The following procedure for a cross check was implemented:

- Whenever the process engineer installs a new standard gas cylinder, it has to be checked that its respective certificate was provided by the supplier of the standard gas cylinder and it is available onsite. Furthermore, it has to be checked that the information given on the label of the standard gas cylinder matches with the information on the cylinder's certificate.
- Lastly, the process engineer has to change the N<sub>2</sub>O cylinder concentration in the DCS acc. to the information given on the certificate.

**Documentation provided by project participant**

Estandar – Cambio de Cilindros patrones ENINOX  
List of Cylinders used during the monitoring period  
Certificates of Analysis from Airgas

**DOE assessment****Date:** 08/04/2021

PP has developed a procedure to ensure that registers are kept of every cylinders change. Additionally PP has provided a list of cylinder used and these have been crosschecked against certificate of analyses provided by suppliers.

The new documentation and procedure allows a organized way to keep track of cylinder substitution during the monitoring period and adds transparency to the CDM project.

FAR03 is closed.

**Table 2. CL from this verification**

CL ID	Section no.	Date: DD/MM/YYYY
N/A		
<b>Project participant response</b>		<b>Date: DD/MM/YYYY</b>
<b>Documentation provided by project participant</b>		
<b>DOE assessment</b>		<b>Date: DD/MM/YYYY</b>

**Table 3. CAR from this verification**

CAR ID	01	Section no.	D.2	Date: 29/01/2020
<b>Description of CAR</b>				
Previous AST was from 09/01/2019 to 10/01/2019. A new AST was conducted only on 05/03/2020. PP has not applied calibration delay guidance.				
<b>Project participant response</b>				<b>Date: 08/04/2021</b>
Preliminary, it shall be noted that an Annual Surveillance Test (AST) is no calibration and does not influence the device calibration (QAL2) at all. EN 14181 defines the AST as "a procedure which is used to evaluate whether the uncertainty of the measured values obtained from the AMS still meet the uncertainty criteria – as demonstrated in the previous QAL2 test".				
Although an AST does not influence the device calibration, and the report of the performed AST was already available during verification, PPs applied a conservative recalculation of the parameters $V_{t,db,n}$ and $v_{i,t,db}$ for the delayed time period of AST by adding the accuracy class of the instrument. The PPs have submitted the revised MR (v. 01.1) and ER calculation sheet (v. 1.1) showing the conservatively taken action.				
<b>Documentation provided by project participant</b>				
5393_MP12_MR v01.1.pdf 5393_MP12_ER Calc v1.1 _ confidential.xlsx				
<b>DOE assessment</b>				<b>Date: 12/04/2021</b>

*DOE assessed PPs calculation and confirms that calibration delay guidance has been duly applied.*

*CAR01 is closed.*

**Table 4. FAR from this verification**

<b>FAR ID</b>	<b>Section No.</b>	<b>Date: DD/MM/YYYY</b>
<b>Description of FAR</b>		
N/A		
<b>Project participant response</b>		<b>Date: DD/MM/YYYY</b>
N/A		
<b>Documentation provided by project participant</b>		
N/A		
<b>DOE assessment</b>		<b>Date: DD/MM/YYYY</b>
N/A		



## Appendix 5- Data and parameters monitored

The verification findings for the monitoring of each parameter are set out below.

Data / Parameter:	P <sub>production,y</sub>	Baseline emissions	
Data unit:	t HNO <sub>3</sub>		
Description:	Production of nitric acid in year y		
Measured/calculated/default	Measured		
Compliance question	Verification findings	Draft OK/ CAR/CL	Final OK/ Not OK
Is the monitoring equipment appropriately installed and operated and are the QA/QC procedures appropriately applied?	<p>ERM CVS evaluated whether this parameter was monitored as required in the monitoring plan.</p> <p><b>a) Equipment specification</b> Nitric Acid Production Coriolis Flow and density transmitter (flowmeter FT-45026 with accuracy class ± 0.15% and temperature transmitter TT-45050 with accuracy class 0.1%).The equipment is found to be in line with the monitoring plan/methodology in terms of specification and accuracy.</p> <p><b>b) Calibration</b> Every 2 years. Calibration information in provided in the final version of the Monitoring Report is confirmed to be correctly reported. ERM CVS confirms that the calibrations have been undertaken as required and were valid throughout the monitoring period. The calibrations have confirmed that the equipment has performed to the required level of accuracy.</p> <p><b>c) Measurement/reading/recording frequency</b> Measuring: Continuously with readings every 1 seconds. Data is recorded hourly.</p> <p><b>d) QA/QC procedures applied</b> Periodic calibration is performed according to supplier's recommendations. The quality assurance and quality control procedures, in terms of equipment operations and maintenance, have been incorporated in the plants ISO 9001:2008 management system.</p> <p><b>e) Cross check</b></p> <ul style="list-style-type: none"><li>• The daily nitric acid production data from the ER Calculation spread sheet was crosschecked for consistency with the daily nitric acid production from DeltaV daily reports (MDI files) and Foxboro /16/. These reading are confirmed to have been duly corrected considering the concentration and density of the nitric acid.</li><li>• ERM CVS checked that the production reported is consistent with the nameplate capacity of the plant.</li><li>• ERM CVS checked that raw data has been correctly transferred to the calculation tool.</li></ul> <p><b>f) Check of information flow</b></p>	OK	OK

<b>Data / Parameter:</b>	<b>P<sub>production,y</sub></b>	<b>Baseline emissions</b>	
<b>Data unit:</b>	t HNO <sub>3</sub>		
<b>Description:</b>	Production of nitric acid in year y		
<b>Measured/calculated/default</b>	Measured		
<b>Compliance question</b>	<b>Verification findings</b>	<b>Draft OK/ CAR/CL</b>	<b>Final OK/ Not OK</b>
	<p>The monitoring instrument transmitters convert the primary sensing signal in a signal that is hardwired transmitted to I/O cards (input cards) where they are collected by DeltaV processor system. These digital values are made available via fiber optics to the DeltaV Continuous Historian Server (CHS). The CHS stores continually the information. From the CHS database the Excel Macros transfer the data for the internal reports. The parameter is exported from the digitally available reports to an excel book for calculation.</p> <p>In addition, the NA at 100% is calculated by multiplying the mass flow with the concentration. The concentration is automatically calculated using the density measurement of the Coriolis flowmeter and the temperature instrument TT- 45050.</p>		
<b>Does the monitoring report (section D) correctly state all relevant information and data relating to the monitoring of this parameter during the monitoring period?</b>	<p>ERM CVS reviewed the content of the monitoring report section D and evaluated its alignment with the requirements of the monitoring plan and the actual monitoring.</p> <p>ERM CVS confirms that the final monitoring report (section D) and Excel spread sheet correctly state all relevant information and data relating to the monitoring of this parameter during the monitoring period.</p>	OK	OK
<b>Conclusion</b>	<p>ERM CVS confirms that</p> <ul style="list-style-type: none"> <li>• The equipment for monitoring has an appropriate accuracy and has been controlled and operated in accordance with the monitoring plan.</li> <li>• The calibrations have been conducted at the frequency as specified by the methodology and the monitoring plan of the registered PDD and/or manufacture specifications.</li> <li>• The monitoring results have been recorded consistently as per the approved frequency in the monitoring plan.</li> <li>• QA/QC procedures have been applied in accordance with the monitoring plan.</li> </ul>		

<b>Data / Parameter:</b>	<b><math>h_y</math></b>	<b>Project emissions</b>	
<b>Data unit:</b>	h		
<b>Description:</b>	Number of hours of operation in year y		
<b>Measured/calculated/default</b>	Measured		
<b>Compliance question</b>	<b>Verification findings</b>	<b>Draft OK/ CAR/CL</b>	<b>Final OK/ Not OK</b>
<b>Is the monitoring equipment appropriately installed and operated and are the QA/QC procedures appropriately applied?</b>	<p>ERM CVS evaluated whether this parameter was monitored as required in the monitoring plan.</p> <p><b>a) Equipment specification</b> AOR Temperature Transmitter (TAG TT-45030A (main), TT-45030B (back up) and TT-45030C (back up))/ thermocouple have accuracy class: <math>\pm 0.25\%</math>. The equipment is found to be in line with the monitoring plan/methodology in terms of specification and accuracy.</p> <p><b>b) Calibration</b> Every 2 years. Calibration information in provided in the final version of the Monitoring Report is confirmed to be correctly reported. ERM CVS confirms that the calibrations have been undertaken as required and were valid throughout the monitoring period. The calibrations have confirmed that the equipment has performed to the required level of accuracy.</p> <p><b>c) Measurement/reading/recording frequency</b> The parameters is measured continuously with reading every 1 seconds. Data is recorded hourly.</p> <p><b>d) QA/QC procedures applied</b> Periodic calibration is performed according to supplier's recommendations. The quality assurance and quality control procedures, in terms of equipment operations and maintenance, have been incorporated in the plants ISO 9001:2008 management system.</p> <p><b>e) Cross check</b></p> <ul style="list-style-type: none"> <li>The hours of operation are determined by the oxidation temperature in the AOR. As determined in the PDD, the temperature ranges from 850 – 905°C correspond to the hours of operation of the CDM project (the plant is considered to be in operation when the temperature is within this range). ERM CVS has therefore crosschecked the temperature ranges occurring during this monitoring confirming that in the Excel spread sheet the plant is considered "in operation" when temperature is within the indicated range.</li> <li>Crosschecked that during the failure of TT-45030A/B/C conservative approach was used by PP in line with methodology.</li> </ul> <p><b>f) Check of information flow</b> The monitoring instrument transmitters convert the primary sensing signal in a signal that is hardwired transmitted to I/O cards (Input cards) where they are collected by DeltaV processor system. These digital values are made available via</p>	OK	OK

Data / Parameter:	h <sub>y</sub>	Project emissions	
Data unit:	h		
Description:	Number of hours of operation in year y		
Measured/calculated/default	Measured		
Compliance question	Verification findings	Draft OK/ CAR/CL	Final OK/ Not OK
	fiber optics to the DeltaV Continuous Historian Server (CHS). The CHS stores continually the information. From the CHS database the Excel Macros transfer the data for the internal reports. The parameter is exported from the digitally available reports to an excel book for calculation.		
Does the monitoring report (section D) correctly state all relevant information and data relating to the monitoring of this parameter during the monitoring period?	ERM CVS reviewed the content of the monitoring report section D and evaluated its alignment with the requirements of the monitoring plan and the actual monitoring.  ERM CVS confirms that the final monitoring report (section D) and Excel spread sheet correctly state all relevant information and data relating to the monitoring of this parameter during the monitoring period.	OK	OK
Conclusion	ERM CVS confirms that <ul style="list-style-type: none"><li>The equipment for monitoring has an appropriate accuracy and has been controlled and operated in accordance with the monitoring plan.</li><li>The calibrations have been conducted at the frequency as specified by the methodology and the monitoring plan of the registered PDD and/or manufacture specifications.</li><li>The monitoring results have been recorded consistently as per the approved frequency in the monitoring plan.</li><li>QA/QC procedures have been applied in accordance with the monitoring plan.</li></ul>		

Data / Parameter:	$h_{r,y}$	Baseline and Project emissions		
Data unit:	h			
Description:	Number of hours (h) in year y where for secondary N <sub>2</sub> O abatement system was not installed, underperformed or failed			
Measured/calculated/default	Measured			
Compliance question	Verification findings		Draft OK/ CAR/CL	Final OK/ Not OK
Is the monitoring equipment appropriately installed and operated and are the QA/QC procedures appropriately applied?	ERM CVS evaluated whether this parameter was monitored as required in the monitoring plan.  <b>a) Equipment specification</b> As the project has not used AM0028 or AM0034 in the first crediting period (Case 2 for the calculation of $h_{r,y}$ as defined in the applied methodology), the abatement system is deemed to be not installed, underperforming or failed in the hour h in year y, if:		OK	OK

<b>Data / Parameter:</b>	<b><math>h_{r,y}</math></b>	<b>Baseline and Project emissions</b>	
<b>Data unit:</b>	h		
<b>Description:</b>	Number of hours (h) in year y where for secondary N <sub>2</sub> O abatement system was not installed, underperformed or failed		
<b>Measured/calculated/default</b>	Measured		
<b>Compliance question</b>	<b>Verification findings</b>	<b>Draft OK/ CAR/CL</b>	<b>Final OK/ Not OK</b>
	$F_{N2O,tailgas,h} > EF_{new,y} \times P_{NA,h}$ <p><b>b) Calibration</b> Not applicable.</p> <p><b>c) Measurement/reading/recording frequency</b> The parameter is measured continuously with 1 second readings and hourly recording.</p> <p><b>d) QA/QC procedures applied</b> The quality assurance and quality control procedures, in terms of plant equipment operations and maintenance have been incorporated in the plants ISO 9001:2008 management system.</p> <p><b>e) Cross check</b> The verifiers went through the ER calculation spread sheet values, results were checked against raw data. Value are correctly considered in line with methodology in the final version of the MR and ER calculation spreadsheet.</p> <p><b>f) Check of information flow</b> The monitoring instrument transmitters convert the primary sensing signal in a signal that is hardwired transmitted to I/O cards (input cards) where they are collected by DeltaV processor system. These digital values are made available via fiber optics to the DeltaV Continuous Historian Server (CHS). The CHS stores continually the information. From the CHS database the Excel Macros transfer the data for the internal reports. The parameter is exported from the digitally available daily reports to an excel book for calculation.</p>		
<b>Does the monitoring report (section D) correctly state all relevant information and data relating to the monitoring of this parameter during the monitoring period?</b>	<p>ERM CVS reviewed the content of the monitoring report section D and evaluated its alignment with the requirements of the monitoring plan and the actual monitoring.</p> <p>ERM CVS confirms that the final monitoring report (section D) and Excel spread sheet correctly state all relevant information and data relating to the monitoring of this parameter during the monitoring period.</p>	OK	OK
<b>Conclusion</b>	<p>ERM CVS confirms that</p> <ul style="list-style-type: none"> <li>The equipment for monitoring has an appropriate accuracy and has been controlled and operated in accordance with the monitoring plan.</li> <li>The monitoring results have been recorded consistently as per the approved frequency in the monitoring plan.</li> <li>QA/QC procedures have been applied in accordance with the monitoring</li> </ul>		

Data / Parameter:	$h_{r,y}$	Baseline and Project emissions			
Data unit:	h				
Description:	Number of hours (h) in year y where for secondary N <sub>2</sub> O abatement system was not installed, underperformed or failed				
Measured/calculated/default	Measured				
Compliance question	Verification findings			Draft OK/ CAR/CL	Final OK/ Not OK
	plan.				

Data / Parameter:	V <sub>t,db</sub>	Project emissions	
Data unit:	m <sup>3</sup> dry gas/h		
Description:	Volumetric flow of the gaseous stream in time interval t on a dry basis		
Measured/calculated/default	Measured		
Compliance question	Verification findings	Draft OK/ CAR/CL	Final OK/ Not OK
Is the monitoring equipment appropriately installed and operated and are the QA/QC procedures appropriately applied?	<p>ERM CVS evaluated whether this parameter was monitored as required in the monitoring plan.</p> <p><b>a) Equipment specification</b> PP uses differential pressure transmitter (TAG FT-45092), with accuracy class 2% of range. The equipment is found to be in line with the monitoring plan/methodology in terms of specification and accuracy.</p> <p><b>b) Calibration</b> Calibration of the meter occurs every 5 years according to EN 14181 (QAL2) and an AST is performed annually. QAL3 is done on a daily basis for zero check and every other day for span by ENAEX maintenance staff. Calibration information as provided in the final version of the Monitoring Report is confirmed to be correctly reported. In line with the requirements of EN14181 a QAL2 /26/ was conducted in November 2016 and is valid for 5 years. An AST/25/ has been done in in January 2019 and in March 2020. The 2019 and 2020 ASTs confirmed the calibration function of the 2016 QAL2, therefore all readings were considered to be correctly recalculated using the correction factors from the 2016 QAL2. Due to the delay in the execution of the AST a CAR was raised associated to the need to apply the calibration delay guidance. This CAR was duly closed by PP.</p> <p>The most recent AST report was available during verification and confirmed that monitoring devices are functional without defects and variability criteria are fulfilled.</p> <p><b>c) Measurement/reading/recording frequency</b> Measuring is continuous with reading every 1 seconds. Data is recorded hourly.</p>	CAR	OK



<b>Data / Parameter:</b>	$V_{t,db}$	<b>Project emissions</b>	
<b>Data unit:</b>	m <sup>3</sup> dry gas/h		
<b>Description:</b>	Volumetric flow of the gaseous stream in time interval t on a dry basis		
<b>Measured/calculated/default</b>	Measured		
<b>Compliance question</b>	<b>Verification findings</b>	<b>Draft OK/ CAR/CL</b>	<b>Final OK/ Not OK</b>
	<p><b>d) QA/QC procedures applied</b> The quality assurance and quality control procedures are based on the application of the requirements of EN 14181.</p> <p><b>e) Cross check</b></p> <ul style="list-style-type: none"> <li>ERM CVS has cross checked the consistency between raw data and input data in the ER calculation spreadsheet and it's used in calculations, including all equipment failures reported during this monitoring period and confirm data substitution as per methodology.</li> <li>The verifiers went through the ER Calculation spread sheet values, and confirm that all substitutions for default value were clearly and correctly considered in line with the methodology.</li> <li>The verifiers checked the usage of the correction factors obtained in the QAL2/26/.</li> <li>The verifiers crosschecked calibration certificates (calibration internal reports). All EN 14181 procedures are implemented and recorded/25/26/. These procedures were verified and all information found in the final version of the ER Calculation spread sheet is deemed correct.</li> <li>Verifiers crosschecked the certificates of standard gases used in calibration.</li> </ul> <p><b>f) Check of information flow</b> The monitoring instrument transmitters convert the primary sensing signal in a signal that is hardwired transmitted to I/O cards (input cards) where they are collected by DeltaV processor system. These digital values are made available via fiber optics to the DeltaV Continuous Historian Server (CHS). The CHS stores continually the information. From the CHS database the Excel Macros transfer the data for the internal reports. The parameter is exported from the digitally available daily reports to an excel book for calculation.</p>		
<b>Does the monitoring report (section D) correctly state all relevant information and data relating to the monitoring of this parameter during the monitoring period?</b>	<p>ERM CVS reviewed the content of the monitoring report section D and evaluated its alignment with the requirements of the monitoring plan and the actual monitoring.</p> <p>ERM CVS confirms that the final monitoring report (section D) and Excel spread sheet correctly state all relevant information and data relating to the monitoring of this parameter during the monitoring period.</p>	OK	OK
<b>Conclusion</b>	<p>ERM CVS confirms that</p> <ul style="list-style-type: none"> <li>The equipment for monitoring has an appropriate accuracy and has been controlled and operated in accordance with the monitoring plan.</li> <li>The calibrations have been conducted at the frequency as specified by</li> </ul>		

Data / Parameter:	V <sub>t,db</sub>	Project emissions		
Data unit:	m <sup>3</sup> dry gas/h			
Description:	Volumetric flow of the gaseous stream in time interval t on a dry basis			
Measured/calculated/default	Measured			
Compliance question	Verification findings		Draft OK/ CAR/CL	Final OK/ Not OK
	the methodology and the monitoring plan of the registered PDD. <ul style="list-style-type: none"><li>• The monitoring results have been recorded consistently as per the approved frequency in the monitoring plan.</li><li>• QA/QC procedures have been applied in accordance with the monitoring plan.</li></ul>			

Data / Parameter:	$V_{i,t,db}$	Project emissions	
Data unit:	m <sup>3</sup> gas i/m <sup>3</sup> dry gas		
Description:	Volumetric fraction of greenhouse gas i in a time interval t on a dry basis		
Measured/calculated/default	Measured		
Compliance question	Verification findings	Draft OK/ CAR/CL	Final OK/ Not OK
Is the monitoring equipment appropriately installed and operated and are the QA/QC procedures appropriately applied?	<p>ERM CVS evaluated whether this parameter was monitored as required in the monitoring plan.</p> <p><b>a) Equipment specification</b> PP uses a Non-dispersive infrared photometry for N<sub>2</sub>O (TAG AT-45094C), with accuracy class: 1% of range. The equipment is found to be in line with the monitoring plan/methodology in terms of specification and accuracy.</p> <p><b>b) Calibration</b> Calibration of the meter occurs every 5 years according to EN 14181 (QAL2) and an AST is performed annually. QAL3 is done on a daily basis for zero check and every other day for span by ENAEX maintenance staff. Calibration information as provided in the final version of the Monitoring Report is confirmed to be correctly reported. In line with the requirements of EN14181 a QAL2 /26/ was conducted in November 2016 and is valid for 5 years. An AST/25/ has been done in in January 2019 and in March 2020. The 2019 and 2020 ASTs confirmed the calibration function of the 2016 QAL2, therefore all readings were considered to be correctly recalculated using the correction factors from the 2016 QAL2. Due to the delay in the execution of the AST a CAR was raised associated to the need to apply the calibration delay guidance. This CAR was duly closed by PP.</p> <p>The most recent AST report was available during verification and confirmed that monitoring devices are functional without defects and variability criteria are fulfilled.</p>	CAR	OK



<b>Data / Parameter:</b>	$V_{i,t,db}$	<b>Project emissions</b>	
<b>Data unit:</b>	m <sup>3</sup> gas i/m <sup>3</sup> dry gas		
<b>Description:</b>	Volumetric fraction of greenhouse gas i in a time interval t on a dry basis		
<b>Measured/calculated/default</b>	Measured		
<b>Compliance question</b>	<b>Verification findings</b>	<b>Draft OK/ CAR/CL</b>	<b>Final OK/ Not OK</b>
	<p><b>c) Measurement/reading/recording frequency</b> Measuring is continuous with reading every 1 seconds. Data is recorded hourly.</p> <p><b>d) QA/QC procedures applied</b> The quality assurance and quality control procedures are based on the application of the requirements of EN 14181.</p> <p><b>e) Cross check</b></p> <ul style="list-style-type: none"> <li>ERM CVS has cross checked the consistency between raw data and input data in the ER calculation spreadsheet and it's used in calculations including all equipment failures reported during this monitoring period and confirm data substitution as per methodology.</li> <li>The verifiers went through the ER Calculation spread sheet values, and confirm that all substitutions for default value were clearly and correctly considered in line with the methodology.</li> <li>The verifiers checked the usage of the correction factors obtained in the QAL2/26/.</li> <li>The verifiers crosschecked calibration certificates (calibration internal reports). All EN 14181 procedures are implemented and recorded/25/26/. These procedures were verified and all information found in the final version of the ER Calculation spread sheet is deemed correct.</li> </ul> <p><b>f) Check of information flow</b> The monitoring instrument transmitters convert the primary sensing signal in a signal that is hardwired transmitted to I/O cards (input cards) where they are collected by DeltaV processor system. These digital values are made available via fiber optics to the DeltaV Continuous Historian Server (CHS). The CHS stores continually the information. From the CHS database the Excel Macros transfer the data for the internal reports. The parameter is exported from the digitally available daily reports to an excel book for calculation.</p>		
<b>Does the monitoring report (section D) correctly state all relevant information and data relating to the monitoring of this parameter during the monitoring period?</b>	<p>ERM CVS reviewed the content of the monitoring report section D and evaluated its alignment with the requirements of the monitoring plan and the actual monitoring.</p> <p>ERM CVS confirms that the final monitoring report (section D) and Excel spread sheet correctly state all relevant information and data relating to the monitoring of this parameter during the monitoring period.</p>	OK	OK
<b>Conclusion</b>	<p>ERM CVS confirms that</p> <ul style="list-style-type: none"> <li>The equipment for monitoring has an appropriate accuracy and has been</li> </ul>		

Data / Parameter:	V <sub>i,t,db</sub>	Project emissions			
Data unit:	m <sup>3</sup> gas i/m <sup>3</sup> dry gas				
Description:	Volumetric fraction of greenhouse gas i in a time interval t on a dry basis				
Measured/calculated/default	Measured				
Compliance question	Verification findings			Draft OK/ CAR/CL	Final OK/ Not OK
	controlled and operated in accordance with the monitoring plan. <ul style="list-style-type: none"><li>• The calibrations have been conducted at the frequency as specified by the methodology and the monitoring plan of the registered PDD.</li><li>• The monitoring results have been recorded consistently as per the approved frequency in the monitoring plan.</li><li>• QA/QC procedures have been applied in accordance with the monitoring plan.</li></ul>				

Data / Parameter:	C <sub>H2O,t,db,n</sub>	Project emissions	
Data unit:	mg H <sub>2</sub> O/m <sup>3</sup> dry gas		
Description:	Moisture content of the gaseous stream at normal conditions in time interval t		
Measured/calculated/default	Measured (by a qualified third party)		
Compliance question	Verification findings	Draft OK/ CAR/CL	Final OK/ Not OK
Is the monitoring equipment appropriately installed and operated and are the QA/QC procedures appropriately applied?	<p>ERM CVS evaluated whether this parameter was monitored as required in the monitoring plan.</p> <p><b>a) Equipment specification</b> Not applicable. The parameter is measured according to the USEPA CF42 method 4 – Gravimetric determination of water content (as set out in the applied methodology, PDD and tool) and measurements coincide with the AST /25/ done by a qualified third party.</p> <p><b>b) Calibration</b> Not Applicable.</p> <p><b>c) Measurement/reading/recording frequency</b> Annually.</p> <p><b>d) QA/QC procedures applied</b> Testing is done according to the USEPA CF42 method 4</p> <p><b>e) Cross check</b></p> <ul style="list-style-type: none"><li>ERM CVS has cross checked the input parameter in the Excel spreadsheet against the results in the AST and QAL2 reports/26/25/. The moisture value in the QAL 2 and AST reports are in line with the requirements of the applied methodology and tool, and significantly lower than the maximum values permitted. As per the methodology and tool</li></ul>	OK	OK

Data / Parameter:	C <sub>H2O,t,db,n</sub>	Project emissions	
Data unit:	mg H <sub>2</sub> O/m <sup>3</sup> dry gas		
Description:	Moisture content of the gaseous stream at normal conditions in time interval t		
Measured/calculated/default	Measured (by a qualified third party)		
Compliance question	Verification findings	Draft OK/ CAR/CL	Final OK/ Not OK
	<p>the moisture content should be less or equal to 0.05 kg H<sub>2</sub>O/m<sup>3</sup> dry gas so that the PP is eligible to use Option A of the <i>Tool to Determine the Mass Flow of a Greenhouse Gas in a Gaseous Stream</i>.</p> <ul style="list-style-type: none"><li>ERM CVS confirms that based on the results obtained, the project is eligible for Option A of the <i>Tool to Determine the Mass Flow of a Greenhouse Gas in a Gaseous Stream</i>.</li><li>ERM CVS confirms that calculation method used in the AST is in line with PDD.</li></ul> <p><b>f) Check of information flow</b> The data is manually inserted in the Excel spread sheet and is generated by testing done by a qualified third party.</p>		
Does the monitoring report (section D) correctly state all relevant information and data relating to the monitoring of this parameter during the monitoring period?	<p>ERM CVS reviewed the content of the monitoring report section D and evaluated its alignment with the requirements of the monitoring plan and the actual monitoring.</p> <p>ERM CVS confirms that the final monitoring report (section D) and Excel spread sheet correctly state all relevant information and data relating to the monitoring of this parameter during the monitoring period.</p>	OK	OK
Conclusion	<p>ERM CVS confirms that</p> <ul style="list-style-type: none"><li>The monitoring results have been calculated and recorded consistently as per the approved frequency in the monitoring plan.</li></ul>		

Data / Parameter:	T <sub>t</sub>	Project emissions		
Data unit:	K			
Description:	Temperature of the gaseous stream in time interval t			
Measured/calculated/default	Measured			
Compliance question	Verification findings		Draft OK/ CAR/CL	Final OK/ Not OK
Is the monitoring equipment appropriately installed and operated and are the QA/QC procedures appropriately applied?	ERM CVS evaluated whether this parameter was monitored as required in the monitoring plan.  <b>a) Equipment specification</b> The temperature is measured with temperature transmitter (TAG TT-45093).The equipment is found to be in line with monitoring the plan/methodology in terms of specification and accuracy.  <b>b) Calibration</b> All pieces of equipment are calibrated every 2 years.		OK	OK

<b>Data / Parameter:</b>	$T_t$	<b>Project emissions</b>	
<b>Data unit:</b>	K		
<b>Description:</b>	Temperature of the gaseous stream in time interval t		
<b>Measured/calculated/default</b>	Measured		
<b>Compliance question</b>	<b>Verification findings</b>	<b>Draft OK/ CAR/CL</b>	<b>Final OK/ Not OK</b>
	<p>Calibration information in provided in the final version of the Monitoring Report is confirmed to be correctly reported. ERM CVS confirms that the calibrations have been undertaken as required and were valid throughout the monitoring period and, where applicable calibration delay guidance has been duly applied by PP.</p> <p>The calibrations have confirmed that the equipment has performed to the required level of accuracy.</p> <p><b>c) Measurement/reading/recording frequency</b> The parameters is measured continuously with readings every 1 seconds. Data recording occurs on hourly basis.</p> <p><b>d) QA/QC procedures applied</b> The quality assurance and quality control procedures, in terms of equipment operations and maintenance have been incorporated in the plants ISO 9001:2008 management system.</p> <p><b>e) Cross check</b> ERM CVS has cross checked the consistency between raw data and input data in the ER calculation spreadsheet and it's used in calculations.</p> <p><b>f) Check of information flow</b> The monitoring instrument transmitters convert the primary sensing signal in a signal that is hardwired transmitted to I/O cards (input cards) where they are collected by DeltaV processor system. These digital values are made available via fiber optics to the DeltaV Continuous Historian Server (CHS). The CHS stores continually the information. From the CHS database the Excel Macros transfer the data for the internal reports. The parameter is exported from the digitally available daily reports to an excel book for calculation.</p>		
<b>Does the monitoring report (section D) correctly state all relevant information and data relating to the monitoring of this parameter during the monitoring period?</b>	<p>ERM CVS reviewed the content of the monitoring report section D and evaluated its alignment with the requirements of the monitoring plan and the actual monitoring.</p> <p>ERM CVS confirms that the final monitoring report (section D) and Excel spread sheet correctly state all relevant information and data relating to the monitoring of this parameter during the monitoring period.</p>	OK	OK
<b>Conclusion</b>	<p>ERM CVS confirms that</p> <ul style="list-style-type: none"> <li>The equipment for monitoring has an appropriate accuracy and has been controlled and operated in accordance with the monitoring plan.</li> <li>The calibrations have been conducted at the frequency as specified by</li> </ul>		

Data / Parameter:	T <sub>t</sub>	Project emissions			
Data unit:	K				
Description:	Temperature of the gaseous stream in time interval t				
Measured/calculated/default	Measured				
Compliance question	Verification findings			Draft OK/ CAR/CL	Final OK/ Not OK
	the methodology and the monitoring plan of the registered PDD. <ul style="list-style-type: none"><li>• The monitoring results have been recorded consistently as per the approved frequency in the monitoring plan.</li><li>• QA/QC procedures have been applied in accordance with the monitoring plan.</li></ul>				

Data / Parameter:	P <sub>t</sub>	Project emissions	
Data unit:	Pa		
Description:	Pressure of the gaseous stream in time interval t		
Measured/calculated/default	Measured		
Compliance question	Verification findings	Draft OK/ CAR/CL	Final OK/ Not OK
Is the monitoring equipment appropriately installed and operated and are the QA/QC procedures appropriately applied?	<p>ERM CVS evaluated whether this parameter was monitored as required in the monitoring plan.</p> <p><b>a) Equipment specification</b> The pressure is measured by a capacitive differential pressure transmitter (TAG PT-45091), and by a capacitive barometric pressure transmitter (TAG PT-45095). Both equipment have an accuracy of 0.1% of span. The equipment are found to be in line with the monitoring plan/methodology in terms of specification and accuracy.</p> <p><b>b) Calibration</b> All pieces of equipment are calibrated every month.</p> <p>Calibration information is provided in the final version of the Monitoring Report is confirmed to be correctly reported. ERM CVS confirms that the calibrations have been undertaken as required and were valid throughout the monitoring period and, where applicable, calibration delay guidance has been duly applied by PP.</p> <p>The calibrations have confirmed that the equipment has performed to the required level of accuracy.</p> <p><b>c) Measurement/reading/recording frequency</b> The parameters is measured continuously with readings every 1 seconds. Data recording occurs on hourly basis.</p> <p><b>d) QA/QC procedures applied</b></p>	OK	OK

<b>Data / Parameter:</b>	<b>P<sub>t</sub></b>	<b>Project emissions</b>	
<b>Data unit:</b>	Pa		
<b>Description:</b>	Pressure of the gaseous stream in time interval t		
<b>Measured/calculated/default</b>	Measured		
<b>Compliance question</b>	<b>Verification findings</b>	<b>Draft OK/ CAR/CL</b>	<b>Final OK/ Not OK</b>
	<p>The quality assurance and quality control procedures, in terms of equipment operations and maintenance have been incorporated in the plants ISO 9001:2008 management system.</p> <p><b>e) Cross check</b></p> <ul style="list-style-type: none"> <li>ERM CVS has cross checked the consistency between raw data and input data in the ER calculation spreadsheet and it's used in calculations.</li> <li>Application of the correct equipment error in the calculation of calibration delay.</li> </ul> <p><b>f) Check of information flow</b></p> <p>The monitoring instrument transmitters convert the primary sensing signal in a signal that is hardwired transmitted to I/O cards (input cards) where they are collected by DeltaV processor system. These digital values are made available via fiber optics to the DeltaV Continuous Historian Server (CHS). The CHS stores continually the information. From the CHS database the Excel Macros transfer the data for the internal reports. The parameter is exported from the digitally available daily reports to an excel book for calculation.</p> <p>The pressure of the gaseous stream is determined by the sum of the static pressure inside the stack and the barometric pressure the Excel file does this calculation automatically. Calibration delay corrections is manually considered in the Excel calculations sheet.</p>		
<b>Does the monitoring report (section D) correctly state all relevant information and data relating to the monitoring of this parameter during the monitoring period?</b>	<p>ERM CVS reviewed the content of the monitoring report section D and evaluated its alignment with the requirements of the monitoring plan and the actual monitoring.</p> <p>ERM CVS confirms that the final monitoring report (section D) and Excel spread sheet correctly state all relevant information and data relating to the monitoring of this parameter during the monitoring period.</p>	OK	OK
<b>Conclusion</b>	<p>ERM CVS confirms that</p> <ul style="list-style-type: none"> <li>The equipment for monitoring has an appropriate accuracy and has been controlled and operated in accordance with the monitoring plan.</li> <li>The calibrations have been conducted at the frequency as specified by the methodology and the monitoring plan of the registered PDD.</li> <li>The monitoring results have been recorded consistently as per the approved frequency in the monitoring plan.</li> <li>QA/QC procedures have been applied in accordance with the monitoring</li> </ul>		

Data / Parameter:	P <sub>t</sub>	Project emissions			
Data unit:	Pa				
Description:	Pressure of the gaseous stream in time interval t				
Measured/calculated/default	Measured				
Compliance question	Verification findings			Draft OK/ CAR/CL	Final OK/ Not OK
	plan.				

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### Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
04.0	6 April 2021	Revision to: <ul style="list-style-type: none"> <li>Reflect the “Clarification: Regulatory requirements under temporary measures for post-2020 cases” (CDM-EB109-A01-CLAR).</li> </ul>
03.0	31 May 2019	Revision to: <ul style="list-style-type: none"> <li>Ensure consistency with version 02.0 of the “CDM validation and verification standard for project activities” (CDM-EB93-A05-STAN);</li> <li>Make structural and editorial improvements.</li> </ul>
02.1	11 January 2018	Editorial revision to correct the numbering of appendices in the instructions.
02.0	31 October 2017	Revision to align with the requirements of the “CDM validation and verification standard for project activities” (version 01.0).
01.0	23 March 2015	Initial publication.
Decision Class: Regulatory Document Type: Form Business Function: Issuance Keywords: project activities, verifying and certifying		