



South Asia

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# Verification and Certification Report

of the Registered CDM Project

“Catalytic N<sub>2</sub>O destruction project at the new nitric acid plant  
PANNA 4 of Enaex S.A.”

UNFCCC reference number: 5393

Monitoring Period #03: 01/07/2012 to 30/09/2012

Report No. 600500887

**21 December 2012**

TÜV SÜD South Asia Pvt. Ltd.  
Environmental Technology  
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Date of first issue of this report	07/12/2012
Revision No. of this report	2
Registered PDD (version/date)	Version 1.2 - 28/09/2011
Registration date	30/11/2011
Revised Monitoring Plan	N/A
Methodology (title; number; version)	N2O abatement from nitric acid production; ACM0019; Version 01.0.0
Crediting period	19/12/2011 to 18/12/2021(fixed)
Published Monitoring Report (version/date)	Version 1 - 07/11/2012
Final Monitoring Report (version/date)	Version 02 - 18/12/2012
Scope	5
Technical Area	5.1
Location of the Project	Barrio Industrial s/n; Mejillones, Antofagasta, Chile GPS coordinates: -23.097400 , -70.430153
Project Participant (contractor)	Enaex S.A. (contractor) Carbon Climate Protection GmbH Mitsubishi Corporation
Project Documentation Link	<a href="http://cdm.unfccc.int/Projects/DB/RWTUV1320421146.84/view">http://cdm.unfccc.int/Projects/DB/RWTUV1320421146.84/view</a>

### VERIFICATION AND CERTIFICATION CONCLUSION

TÜV SÜD South Asia Pvt. Ltd. has performed the periodic verification of the aforementioned CDM project activity. The verification is based on the currently valid documentation of the United Nations Framework Convention on Climate Change (UNFCCC).

The management of Enaex S.A. is responsible for the preparation of the GHG emissions data and the reported GHG emission reductions on the basis set out within the project's Monitoring Plan indicated in the registered PDD and the applied methodology.

The verifier can confirm that:

- the development and maintenance of records and reporting procedures are in accordance with the registered monitoring plan;
- the project is operated as planned and described in the project design document approved by the EB;
- the installed equipment being essential for generating emission reduction runs reliably and is calibrated appropriately;
- the monitoring system is in place and generates GHG emission reductions data;
- the GHG emission reductions are calculated without material misstatements;
- the monitoring plan in Monitoring Report is as per the PDD and monitoring plan approved by the EB;
- the monitoring plan in the approved PDD is as per the applied methodology;
- There is an audit trail that contains the evidence and records that validate the stated figures.

Based on the information we have seen and evaluated, we confirm that the project activity

achieved the verified amount of reductions in anthropogenic emissions by sources of greenhouse gases that would not have occurred in the absence of the project activity.

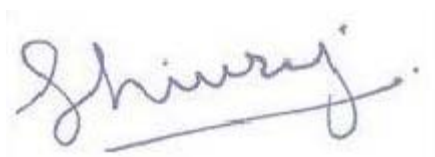
Verified emission reductions in this monitoring period: 50 763 t CO<sub>2e</sub>

Baseline: 82 778 tCO<sub>2e</sub>

Project emissions: 32 024 tCO<sub>2e</sub>

Leakage: 0 tCO<sub>2e</sub>

Pune, 21/12/2012



Certification Body "Environment and Energy"  
TÜV SÜD South Asia

## Abbreviations

<b>ACM</b>	Approved Consolidated Methodology
<b>CAR</b>	Corrective Action Request
<b>CDM</b>	Clean Development Mechanism
<b>CDM-EB</b>	CDM Executive Board
<b>CER</b>	Certified Emission Reduction
<b>CMP</b>	Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol
<b>CO<sub>2e</sub></b>	Carbon dioxide equivalent
<b>CR / CL</b>	Clarification Request
<b>DNA</b>	Designated National Authority
<b>DOE</b>	Designated Operational Entity
<b>EF</b>	Emission Factor
<b>EIA / EA</b>	Environmental Impact Assessment / Environmental Assessment
<b>ER</b>	Emission Reduction
<b>FAR</b>	Forward Action Request
<b>GHG</b>	Greenhouse Gas(es)
<b>GWP</b>	Global Warming Potential
<b>IPCC</b>	Intergovernmental Panel on Climate Change
<b>IRL</b>	Information Reference List
<b>KP</b>	Kyoto Protocol
<b>MP</b>	Monitoring Plan
<b>MR</b>	Monitoring Report
<b>PCP</b>	Project Cycle Procedure
<b>PDD</b>	Project Design Document
<b>PP</b>	Project Participant
<b>PS</b>	Project Standard
<b>TÜV SÜD</b>	TÜV SÜD South Asia Pvt. Ltd
<b>UNFCCC</b>	United Nations Framework Convention on Climate Change
<b>VVS</b>	Clean Development Mechanism Validation And Verification Standard

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Annex 1: List of Findings

Annex 2: Information Reference List

Annex 3: Appointment Certificate

## 1 METHODOLOGY

### 1.1 Objective

TÜV SÜD has been commissioned by the aforementioned client to perform an independent verification assessment.

The objective of the verification work is to comply with the requirements of paragraph 62 of the CDM Modalities and Procedures. According to this assessment TÜV SÜD shall:

- ensure that the project activity has been implemented and operated as per the registered PDD and that all physical features (technology, project equipment, monitoring and metering equipment) of the project are in place,
- ensure that the published MR and other supporting documents provided are complete, verifiable and in accordance with applicable CDM requirements,
- ensure that the actual monitoring systems and procedures comply with the monitoring systems and procedures described in the monitoring plan and the approved methodology,
- evaluate the data recorded and stored as per the applicable requirements.

### 1.2 Scope

The verification scope encompasses an independent and objective review and ex-post determination of the monitored reductions in GHG emissions by the Designated Operational Entity. The verification is based on the submitted monitoring report, the validated project design documents including its monitoring plan and validation report, previous verification reports (if any), the applied monitoring methodology, relevant decisions, clarifications and guidance from the CMP and the EB and any other information and references relevant to the project activity's resulting emission reductions. These documents are reviewed against the requirements of the Kyoto Protocol, the CDM Modalities and Procedures and related rules and guidance.

Based on the requirements in the VVS, TÜV SÜD has applied a rule-based approach for the verification of the project. The principles of accuracy, completeness, relevance, reliability and credibility were combined with a conservative approach to establish a traceable and transparent verification opinion.

The verification considers both quantitative and qualitative information on emission reductions.

The verification is not meant to provide any consultancy towards the client. However, stated requests for clarifications, corrective and/or forward actions may provide input for improvement of the monitoring activities.

### 1.3 Verification Process

The information provided by the project participants is assessed by applying the means of verification specified in the VVS and in the absence of specific means of verification specified in the VVS the standard auditing techniques are applied.

Once TÜV SÜD receives the Monitoring Report and a confirmation from any PP to upload, the MR is made publicly available through a dedicated interface on the UNFCCC CDM website.

A competent assessment team is selected prior to the start of the verification. The team is selected to cover the technical area(s), sectoral scope(s) and relevant host country experience for evaluating the CDM project activity. Additionally a competent Technical Reviewer or Technical Reviewer Team is appointed to conduct checks on quality and completeness.

The verification team performs first a desk review, followed by an on-site visit, which results in the formation of a draft report and a list of findings. The next step involves the evaluation of the findings through direct communication with the PPs and then finally the preparation of the

verification report. This verification report and other supporting documents then undergo an internal quality control by the CB “Environment and energy” before submission to the CDM-EB.

## 1.4 Appointment of the Team

According to the technical scopes and experiences in the sectoral or national business environment, TÜV SÜD has composed an assessment team in accordance with the appointment rules of the TÜV SÜD Certification Body “Environment and Energy”.

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

- Assessment Team Leader (ATL);
- Verifier (V);
- Verifier Trainee (T);
- Technical Experts (TE);
- Country expert (CE);
- Technical reviewer (TR).

It is required that the sectoral scope(s) and the technical area(s) (TA) linked to the methodology/ies and project have to be covered by the assessment team. Appointment certificates of the selected team members are attached to this report as Annex.

### Assessment Team:

Name	Qualification	Scope	Technical Area	Host country experience	Onsite visit
Hammer, Martin	ATL	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> (All)	-	-
Saldias Kiefer, Lester	V	<input checked="" type="checkbox"/>	-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Tollio Vanhaz, Dante Luis	TE	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> (All)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

### Technical Reviewer:

Name	Qualification	Scope	Technical area
Tausche, Konrad	TR	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> (All)

## 1.5 Review of Documents

Publication has been initiated before the verification activities started. Based on the published MR the assessment team performed a desk review to:

- verify the completeness of the data and the information presented in the MR,
- check the compliance of the MR with respect to the monitoring plan depicted in the registered PDD and verify that the applied methodology was carried out. Particular attention to the frequency of measurements, the quality of the metering equipment including calibration requirements, and the quality assurance and quality control procedures was paid,
- evaluate the data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions.

A complete list of all documents reviewed is available in the Information Reference List attached as Annex 2 to this report.

## 1.6 On-site Assessment and follow-up Interviews

During on-site visit (dates of on-site visit 03/12/2012 – 04/12/2012) TÜV SÜD performed a physical site inspection and interviewed project stakeholders to:

- confirm the implementation and operation of the project,
- review the data flow for generating, aggregating and reporting the monitoring parameters,
- confirm the correct implementation of procedures for operations and data collection,
- cross-check the information provided in the MR documentation with other sources,
- check the monitoring equipment against the requirements of the PDD and the approved methodology, including calibrations, maintenance, etc.,
- review the calculations and assumptions used to obtain the GHG data and ER,
- identify if the quality control and quality assurance procedures are in place to prevent or correct errors or omissions in the reported parameters.

A list of all persons interviewed is included in the IRL attached as Annex 2 to this report.

## **1.7 Resolution of Clarification and Corrective and Forward Action Requests**

The objective of this phase of the verification is to resolve the requests for corrective actions, clarifications, and any other outstanding issues which need to be clarified for TÜV SÜD's conclusion on the achieved emission reductions. The CARs and CRs raised by TÜV SÜD are resolved during communication between the client and TÜV SÜD. To guarantee the transparency of the verification process, the concerns raised and responses that have been given are documented in detail in the List of Findings that is attached as Annex 1 to this report.

## **1.8 Internal Quality Control**

Internal quality control within the team is assured by means of a technical review process that takes place after the on-site assessment and after closure of findings. The internal quality control in the verification process is given by the final decision (Verification and Certification Conclusion) made by the CB "Environment and Energy".



## 2 REPORTING REQUIREMENTS

In the following sections, the results of the verification are stated. The verification results relate to the project performance as documented and described in the final PDD and final Monitoring Report. The verification findings for each verification subject are presented below.

### 2.1 FARs from Validation / Previous Verification

The verification team confirms that all FARs presented in the validation report and/or previous verification reports have been correctly addressed by the PPs.

<b>Outstanding Requests from Validation</b>	During the first verification process, the verifier shall be checked that appropriate training has been carried out among the people involved in the project.
Summary of project owner response	Evidence of appropriate training of the people involved in the project was provided to the assessment team.
Conclusion	<input checked="" type="checkbox"/> This Finding has been closed during 1 <sup>st</sup> Verification.

<b>Outstanding Requests from 1<sup>st</sup> Verification</b>	After identification of a problem in the programming of automatic QAL3 procedure, PPs switched to manual QAL3 mode in the first monitoring period. When switching back to automatic QAL3 mode, sufficient evidences on the proper functioning of automatic QAL 3 shall be provided.
Summary of project owner response	N/A as discussed during onsite visit.
Conclusion	<input checked="" type="checkbox"/> This Finding has been closed during 2 <sup>nd</sup> Verification

### 2.2 Project Implementation in accordance with the registered Project Design Document

The project is fully implemented according to the description presented in the registered PDD. The verifier confirms, through the visual inspection that all physical features of the proposed CDM project activity including data collecting systems and storage have been implemented in accordance with the registered PDD. The project activity is completely operational and the same has been confirmed during the on-site visit.

The difference in the values does not lead to a substantial increment of the ER in this period or in future periods in relation to the estimates in the registered PDD.

### 2.3 Compliance of the Monitoring Plan with the Monitoring Methodology

The monitoring plan is in accordance with the approved methodology applied by this CDM project activity. Neither a revision nor a deviation to the monitoring plan has been requested to the CDM Executive Board.

## 2.4 Compliance of the Monitoring with the Monitoring Plan

The monitoring has been carried out in accordance with the monitoring plan contained in the registered PDD. All parameters were monitored and determined as per the Monitoring Plan.

Data transfer from meters to the monitoring report is realized as follows:

The instruments transmitters convert the primary sensing signal (resistance, voltage, Infrared light, etc.) to a 4 - 20 mA analogue signal according to range and units configured. These signals are hardwired transmitted to I/O cards (analogue input cards) and collected by the DeltaV Processor. These digital values are made available in the fibre optics network to be processed, among others, in controller blocks, other variables calculations and DeltaV Continuous Historian Server (CHS). Modifications of the Delta V, which are protected by security levels by the supplier, are tracked by a Version Control Tool. The CHS is installed in the ProPlus station where the information of field process variables are stored. The hourly averages (.csv-files) were manually transferred to the Excel Calculation Tool followed by a quality procedure. A Macro for automatic data transfer is currently under preparation.

To calculate the Emission Reductions, two Excel Files are available.

- Step 1: Transfer to the Excel Tool. No manual recalculations applied.
- Step 2 Calculation based on the transferred data according to the applied methodology and tool and any manual recalculation.

The verification of the parameters required by the monitoring plan is provided as follows:

<b>Data / Parameter:</b>	$P_{NA,n}$
<b>Data unit:</b>	tHNO <sub>3</sub>
<b>Description:</b>	Nitric acid produced in the monitoring period n
<b>Source of data used:</b>	<p>The coriolis type mass flow meter and the integrated density measurement deliver values, which are used as basis for calculation of the concentration (taking into consideration the measured temperature of the nitric acid). The nitric acid at 100% is calculated by multiplying the mass flow with the concentration. Then nitric acid produced is automatically recorded in the Delta V system and provided as hourly averages in Excel sheet which is derived from Delta V system (csv.files).</p> <p>The equipment used has been calibrated according to the requirements of as specified by the approved monitoring plan of the registered PDD. The instruments are calibrated according to the manufacturer's specification (IRL 6a, 6c). The calibration certificates were provided as evidence of the calibration work performed (IRL 7a, 7e). Hence it is confirmed that calibration was not delayed.</p>
<b>Means of verification/Comments:</b>	<p>Data provided in the raw data sheet and raw data to calculate HNO<sub>3</sub> concentration (IRL 9b, IRL 9c) were traced by the verifier with the help graphs over the whole period. In case of peculiarities the graph was zoomed and checked with special awareness taking into consideration the specific operation of the facility as demonstrated by other related parameter to verify explanations given. The reported data found to be consistent with the ProPlus graphs.</p> <p>DeltaV Monthly reports (.mdi-files) (IRL 9a) were used to verify correct transfer of raw data to the Excel Tool.</p>
<b>Cross-check</b>	PPs provided daily production data for this monitoring period "Listado de Producciones Diarias Planta Prillex América" (IRL 12b) that includes data recorded manually once every day from Foxboro DCS. The verifier could crosscheck reported nitric acid production of the monitoring period in MR with this data source. The difference was found to in a reasonable range.

	In addition the calculation of HNO <sub>3</sub> concentration (based on density and temperature of HNO <sub>3</sub> produced) has been crosschecked with empirical values of HNO <sub>3</sub> temperature, density and concentration.
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<b>Data / Parameter:</b>	$h_n$
Data unit:	-
Description:	Number of hours of operation in a monitoring period n
Source of data used:	<p>According to PDD the hours of operation are determined by the oxidation Temperature in the AOR.</p> <p>The temperature is reported automatically by three independent measurement points (TAG numbers TT-45030A – C) measuring the temperature at the same time. The value of the instrument with the TAG number TT-45030A was selected as main signal for monitoring the operation temperature; TT45030B and TT45030C are used as back-up signals in case TT-45030A is not fully functional.</p> <p>The oxidation temperature is automatically recorded in the Delta V system and provided as hourly averages in Excel sheet which is derived from Delta V system (csv.files).</p> <p>Type: digital (DCS)</p> <p>The plant is considered to be in operation when the temperature is in a range from 850°C to 905°C. The range has been validated (IRL 1b).</p> <p>The equipment used has been calibrated according to the requirements of as specified by the approved monitoring plan of the registered PDD. The instruments are calibrated according to the manufacturer's specification (IRL 6b). The calibration certificate was provided as evidence of the calibration work performed (IRL 7d). Hence it is confirmed that calibration was not delayed.</p>
Means of verification/Comments:	<p>Data provided in the raw data sheet were traced by the verifier with the help of ProPlus graphs over the whole period. In case of peculiarities the graph was zoomed and checked with special awareness taking into consideration the specific operation of the facility as demonstrated by other related parameter to verify explanations given.</p> <p>DeltaV Monthly reports (.mdi-files) (IRL 9a) were used to verify correct transfer of raw data to the Excel Tool.</p>
Cross-check	<p>To cross-check the data the values of the three thermocouples TT-45030A TT-45030B and TT-45030C were compared to each other.</p> <p>The values were found to be consistent over the period except the plant shut down periods during 23/07/2012 to 29/07/2012 and from 28/08/2012 to 04/09/2012 because of maintenance works performed (see also Clarification Request 02).</p>

<b>Data / Parameter:</b>	$V_{t,db}$
Data unit:	m <sup>3</sup> dry gas/h
Description:	Volumetric flow of the gaseous stream in time interval t on a dry basis
Source of data used:	<p>The total gas volume is continuously measured by a DURAG DFL 100 DS and automatically recorded in the Delta V system and provided as hourly averages in Excel sheet which is derived from Delta V system (csv.files).</p> <p>The equipment used has been calibrated according to the requirements as specified by the applied methodology.</p> <p>The correction factors derived from the calibration curve for the monitoring components as determined during the QAL2-test in accordance with EN14181 are applied to both the N<sub>2</sub>O concentration and the volume flow of the tail gas. The QAL2 parameters are applied to the calculated hourly averages as part of the calculation of project emissions in the Excel calculation tool (IRL 10). This is in accordance with the applied methodology. The QAL2 report (IRL 7b) was provided as evidence of the calibration work performed. Hence it is confirmed that calibration was not delayed.</p>
Means of	Data provided in the raw data sheet were traced by the verifier with the help

verification/Comments:	of ProPlus graphs over the whole period. In case of peculiarities the graph was zoomed and checked with special awareness taking into consideration the specific operation of the facility as demonstrated by other related parameter to verify explanations given. DeltaV Monthly reports (.mdi-files) (IRL 9a) were used to verify correct transfer of raw data to the Excel Tool.
Cross-check	In order to ensure the integrity of the data, the verification team reviewed the series of hourly data in parallel with other parameters including to make graphs in the Excel file calculation sheets submitted, e.g. to see peculiarity in the graph shape, to check the similarity between nitric acid produced and tail gas flow, to see the overall integrity of oxidation temperature. The data were found to be plausible.

<b>Data / Parameter:</b>	$V_{i,t,db}$
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
Source of data used:	The volumetric fraction of N <sub>2</sub> O is continuously measured by an non-dispersive infrared photometry for N <sub>2</sub> O and automatically recorded in the Delta V system and provided as hourly averages in Excel sheet which is derived from Delta V system (csv.files). The equipment used has been calibrated according to the requirements as specified by the applied methodology. The correction factors derived from the calibration curve for the monitoring components as determined during the QAL2-test in accordance with EN14181 are applied to both the N <sub>2</sub> O concentration and the volume flow of the tail gas. The QAL2 parameters are applied to the calculated hourly averages as part of the calculation of project emissions in the Excel calculation tool (IRL 10). This is in accordance with the applied methodology. The QAL2 report (IRL 7b) provided as evidence of the calibration work performed. Hence it is confirmed that calibration was not delayed.
Means of verification/Comments:	Data provided in the raw data sheet were traced by the verifier with the help of ProPlus graphs over the whole period. In case of peculiarities the graph was zoomed and checked with special awareness taking into consideration the specific operation of the facility as demonstrated by other related parameter to verify explanations given. DeltaV Monthly reports (.mdi-files) (IRL 9a) were used to verify correct transfer of raw data to the Excel Tool. Due to a broken catchment basket a significant amount of secondary catalyst got lost during this monitoring period (after plant shutdown on 15-16/02/2012). Photos of the secondary catalyst bed (IRL 11b) (taken on 25/07/2012 when the catchment was repaired and secondary catalyst refilled) and the a installation report from Hereaus (IRL 11a) were reviewed by the verification team. As a consequence of the secondary catalyst lost, the N <sub>2</sub> O abatement efficiency decreased significantly and the N <sub>2</sub> O concentration in the stack gas increased. Because of the increased N <sub>2</sub> O concentration, the QAL2 parameters for N <sub>2</sub> O analyser obtained during the QAL2 performed in December 2011 exceed the calibrated range (cf. Chapter 6.5 "Calibration function of the AMS and its validity" of EN14181 (IRL 5a). Hence PPs repeated the QAL2 for the N <sub>2</sub> O analyser timely in June 2012 in accordance with EN14181 and applied the new QAL2 parameters properly as verified with the formulas applied in the Excel calculation tool (IRL 10a). After the plant shut down (23/07/2012 to 29/07/2012) when the secondary catalyst has been refilled again, the N <sub>2</sub> O concentration decreased to the level before catalyst loss observed during previous verifications (IRL 1d).
Cross-check	In order to ensure the integrity of the data, the verification team reviewed the series of hourly data in parallel with other parameters including to make graphs in the Excel file calculation sheets submitted, e.g. to see peculiarity in the graph shape, to check the similarity between nitric acid produced and tail

	gas flow and N <sub>2</sub> O concentration. The data were found to be plausible
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<b>Data / Parameter:</b>	$T_t$
<b>Data unit:</b>	K
<b>Description:</b>	Temperature of the gaseous stream in time interval t
<b>Source of data used:</b>	<p>The temperature of tail gas is continuously measured by a PT 100 resistance thermometer and automatically recorded in the Delta V system and provided as hourly averages in Excel sheet which is derived from Delta V system (csv.files).</p> <p>The equipment used has been calibrated according to the requirements of as specified by the applied methodology. The instruments are calibrated according to the manufacturer's specification (IRL 6d).</p> <p>The calibration certificate (IRL 7c) was provided as evidence of the calibration work performed. Hence it is confirmed that calibration was not delayed.</p>
<b>Means of verification/Comments:</b>	<p>Data provided in the raw data sheet were traced by the verifier with the help of ProPlus graphs over the whole period. In case of peculiarities the graph was zoomed and checked with special awareness taking into consideration the specific operation of the facility as demonstrated by other related parameter to verify explanations given.</p> <p>DeltaV Monthly reports (.mdi-files) (IRL 9a) were used to verify correct transfer of raw data to the Excel Tool.</p>
<b>Cross-check</b>	<p>In order to ensure the integrity of the data, the verification team reviewed the series of hourly data in parallel with other parameters including to make graphs in the Excel file calculation sheets submitted, e.g. to see peculiarity in the graph shape, to check the similarity between nitric acid produced and tail gas flow and N<sub>2</sub>O concentration. The data were found to be plausible</p>

<b>Data / Parameter:</b>	$P_t$
<b>Data unit:</b>	Pa
<b>Description:</b>	Pressure of the gaseous stream in time interval t
<b>Source of data used:</b>	<p>Static and atmospheric pressure data are continuously measured by Capacitive pressure transducers and data is automatically recorded in the Delta V system and provided as hourly averages in Excel sheet which is derived from Delta V system (csv.files).</p> <p>DeltaV Monthly reports (.mdi-files) (IRL 9a) were used to verify correct transfer of raw data to the Excel Tool.</p> <p>The equipment used has been calibrated according to the requirements of as specified by the applied methodology. The instruments are calibrated according to the manufacturer's specification (IRL 6d).</p> <p>The calibration certificates (IRL 7f, IRL 7g) were provided as evidence of the calibration work performed. Hence it is confirmed that calibration was not delayed.</p>
<b>Means of verification/Comments:</b>	<p>Data provided in the raw data sheet were traced by the verifier with the help of ProPlus graphs over the whole period. In case of peculiarities the graph was zoomed and checked with special awareness taking into consideration the specific operation of the facility as demonstrated by other related parameter to verify explanations given.</p> <p>DeltaV Monthly reports (.mdi-files) (IRL 9a) were used to verify correct transfer of raw data to the Excel Tool.</p> <p>During those hours where the instruments were out of operation due to calibration activities, PPs have applied downtime procedure according to the applied methodology as verified by reviewing the formulas applied in the Excel calculation tool (IRL 10a).</p>
<b>Cross-check</b>	<p>In order to ensure the integrity of the data, the verification team reviewed the series of hourly data in parallel with other parameters including to make graphs in the Excel file calculation sheets submitted, e.g. to see peculiarity in the graph shape, to check the similarity between nitric acid produced and tail</p>



	gas flow and N <sub>2</sub> O concentration. The data were found to be plausible
<b>Data / Parameter:</b>	$C_{H_2O,t,db,n}$
<b>Data unit:</b>	mg H <sub>2</sub> O/m <sup>3</sup> dry gas
<b>Description:</b>	Moisture content of the gaseous stream at normal conditions, in time interval t
<b>Source of data used:</b>	Measurements according to USEPA CF 42 method 4 – Gravimetric determination of water content (AST Report).
<b>Means of verification/Comments:</b>	Option A of the tool can be applied, as the moisture content is less than 0.05 kg H <sub>2</sub> O/m <sup>3</sup> dry gas. The highest measured value according to AST report (IRL 8c) is 0.0036 kg H <sub>2</sub> O/m <sup>3</sup> dry gas (= 3,600 mg H <sub>2</sub> O/m <sup>3</sup> dry gas).
<b>Cross-check</b>	The validating DOE mentions (IRL 1b): <i>In the mass balance, the expected moisture content given by the technology supplier at design operation conditions is far below 0.05 kgH<sub>2</sub>O/m<sup>3</sup> dry gas. Although the mass balance is given for design operating conditions not considering the presence of the secondary catalyst, this value is deemed to be acceptable since the secondary catalyst only affects the composition of the gas in terms of N<sub>2</sub>O.</i> The moisture content measured during AST by third party is in compliance with the observations of validating DOE.

## 2.5 Assessment of Data and Calculation of Greenhouse Gas Emission Reductions

All data has been available and all the parameters have been monitored in accordance with the registered monitoring plan. Conservative default values and values from back up meter have been used in accordance with the registered monitoring plan as explained above in chapter 2.4. The reported data have been cross-checked against other sources available as explained above in chapter 2.4.

The verifier confirms that the methods and formulae used to obtained the baseline, project and leakage emissions are appropriate. The same has been done in accordance with the methods and formulae described in the registered monitoring plan and applicable methodology.

The verifier confirms that the monitoring report includes all parameters and the monitored data at the intervals required by the methodology and PDD.

The verifier confirms that all the emission factors and default values (ex-ante values from PDD) have been correctly justified. No assumptions have been applied by the project participant. All the emission factors and default values are explicitly mentioned in the monitoring report.

The emissions reductions achieved during this monitoring period are lower than estimated in PDD.

### Ex-ante values from PDD – not monitored parameters

<b>Data / Parameter:</b>	$EF_{default,y}$
<b>Data unit:</b>	kgN <sub>2</sub> O/tHNO <sub>3</sub>
<b>Description:</b>	Default N <sub>2</sub> O baseline emissions factor in the calendar year y of the monitoring period n
<b>Source of data used:</b>	According to PDD and ACM0019 version 01.0.0.
<b>Means of verification/Comments:</b>	The applied emissions factors have been compared with the default value given in the PDD and applied methodology. The correct values are applied.
<b>Cross-check</b>	Not applicable

<b>Data / Parameter:</b>	$GWP_{N_2O}$
<b>Data unit:</b>	tCO <sub>2</sub> e/tN <sub>2</sub> O
<b>Description:</b>	Global warming potential of N <sub>2</sub> O valid for the commitment period

Source of data used:	According to PDD and ACM0019 version 01.0.0.
Means of verification/Comments:	The applied value has been compared with the default value given in the PDD and applied methodology. The correct value is applied.
Cross-check	Not applicable

<b>Data / Parameter:</b>	$R_u$
Data unit:	Pa.m <sup>3</sup> /kmol.K
Description:	Universal ideal gases constant
Source of data used:	According to PDD and "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 02.0.0)
Means of verification/Comments:	The applied value has been compared with the default value given in the PDD and applied methodology. The correct value is applied.
Cross-check	Not applicable

<b>Data / Parameter:</b>	$MM_i$
Data unit:	kg/kmol
Description:	Molecular mass of N <sub>2</sub> O
Source of data used:	According to PDD and "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 02.0.0)
Means of verification/Comments:	The applied value has been compared with the default value given in the PDD and applied methodology. The correct value is applied.
Cross-check	Not applicable

## **Annex 1**

### **List of Findings**



## List of Findings - Compilation and Resolutions

Project Title: Catalytic N<sub>2</sub>O destruction project at the new nitric acid plant PANNA 4 of Enaex S.A.

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Definitions contained in the Glossary of CDM terms and applied in the Standard	
<b>Shall / Should / May</b>	In addition to the definitions contained in the Glossary of CDM terms, the following terms apply in the VVS (VVS/10): <u>Shall</u> is used to indicate requirements to be followed; <u>Should</u> is used to indicate that among several possibilities, one course of action is recommended as particularly suitable; <u>May</u> is used to indicate what is permitted.
<b>Credible</b>	Information is credible if it is authentic and is able to inspire belief or trust, and the willingness of persons to accept the quality of evidence. (VVS/17)
<b>Reliable</b>	Information is reliable if the quality of evidence is accurate and credible and able to yield the same results on a repeated basis. (VVS/17)
<b>CAR</b>	The DOE shall raise a CAR if one of the following situations occur: (VVS/220) (a) Non-compliance with the monitoring plan or methodology are found in monitoring and reporting and has not been sufficiently documented by the project participants, or if the evidence provided to prove conformity is insufficient; (b) Modifications to the implementation, operation and monitoring of the registered project activity has not been sufficiently documented by the project participants; (c) Mistakes have been made in applying assumptions, data or calculations of emission reductions that will impact the quantity of emission reductions; (d) Issues identified in a FAR during validation to be verified during verification or previous verification(s) have not been resolved by the project participants.
<b>CL</b>	The DOE shall raise a CL if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met. (VVS/221)
<b>FAR</b>	The DOE shall raise a FAR during verification for actions if the monitoring and reporting require attention and/or adjustment for the next verification period. (VVS/223)

## Compilation and Resolutions of CARs, CRs and FARs

Corrective Action Requests by the assessment team		
	Comments and Results	Conclusion and IRL
Issue	The project participants registered at the UNFCCC page is not consistent with the PPs reported in the MR.	<input checked="" type="checkbox"/> This Finding is closed. IRL 1f IRL 2a
Requirement	Guidelines for completing the monitoring report form EB 66 Annex 20: List in the table below Party(ies) and project participant(s) involved in the project activity.	
Corrective Action Request	<b><u>Corrective Action Request No.1</u></b> The project participants for the project activity shall be completely reported in the MR.	
Response	The project participants list was updated in the MR. The corrected MR was provided to the assessment team.	

## List of Findings - Compilation and Resolutions

Project Title: Catalytic N2O destruction project at the new nitric acid plant PANNA 4 of Enaex S.A.

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Assessment Means of verification	The verifier reviewed the revised MR (IRL 1f) with special focus on Chapter A.3. The PPs reported there were found to be consistent with the registered PPs under project site at UNFCCC.	
Changes in the monitoring report or supporting annexes	The PP "Mitsubishi Corporation" from Japan has been included in Chapter A.3. of the MR.	
Issue	<p>The secondary catalyst had been re-filled during this monitoring period.</p> <p>Background (verified during previous verification):</p> <p>Due to a broken catchment basket a significant amount of secondary catalyst got lost during this monitoring period (after plant shutdown on 15-16/02/2012). Photos of the secondary catalyst bed (IRL 11b) (taken on 25/07/2012 when the catchment was repaired and secondary catalyst refilled) were reviewed by the verification team. As a consequence of the secondary catalyst lost, the N2O abatement efficiency decreased significantly and the N2O concentration in the stack gas increased.</p> <p>However no information about this event was found in the MR.</p>	<input checked="" type="checkbox"/> This Finding is closed. IRL 1f IRL 11a IRL 11b
Requirement	<p>Guidelines for completing the monitoring report form EB 66 Annex 20: Relevant dates for the project activity (e.g. construction, commissioning, continued operation periods, etc.);</p> <p>EB 65 Annex 5 para. 188: Project participants shall provide a description of the implemented registered CDM project activity as follows: (b) Information on the implementation and actual operation of the project activity, including relevant dates (e.g. construction, commissioning, continued operation periods, etc.).</p>	
Corrective Action Request	<p><b><u>Corrective Action Request No.2</u></b></p> <p>The MR shall include all information on the implementation and actual operation of the project activity.</p>	
Response	The MR was corrected including information about secondary catalyst refill during scheduled shutdown. The corrected MR was provided to the assessment team.	
Assessment Means of verification	The verifier reviewed the revised MR (IRL 1f) with special focus on the description of the events during this monitoring period in Chapter B.1. Hence the secondary catalyst refilling during scheduled shutdown on 25/07/2012 was found to be transparently described. The information	

## List of Findings - Compilation and Resolutions

Project Title: Catalytic N2O destruction project at the new nitric acid plant PANNA 4 of Enaex S.A.

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	was found to be consistent with an Inspection and Installation Report from Heraeus (IRL 11a).	
Changes in the monitoring report or supporting annexes	The information in Chapter B.1. of the Monitoring Period has been extended.	
Issue	<ol style="list-style-type: none"> <li>PPs report in the MR about an QAL2 on 24/09/2012 that was actually not a QAL2 but an AST</li> <li>Inconsistent information for serial number and calibration dates were found compared to calibration certificates for instrument TT 45030C (ammonia oxidation temperature)</li> <li>Incomplete information about instruments used during this monitoring period was found for parameter <math>h_n</math> (Number of hours of operation in a monitoring period <math>n</math>) that is determined by the ammonia oxidation temperature</li> </ol>	<input checked="" type="checkbox"/> This Finding is closed. IRL 1f IRL 7b IRL 7d IRL 8c
Requirement	VVS 17d: In carrying out its validation and verification work, the DOE shall: Assess the accuracy, conservativeness, relevance, completeness, consistency, and transparency of the information provided by project participants	
Corrective Action Request	<b><u>Corrective Action Request No.3</u></b> QAL2/AST dates shall be correctly reported and the AST report should be provided to the assessment team Information about instruments used during this monitoring period shall be complete and correct.	
Response	The QAL2/AST dates were corrected for the respective instruments in the MR. Also, information about serial number and calibration dates for TT-45030C were updated. The information about instruments parameter $h_n$ was completed and updated. All the relevant documentation including the MR were provided to the assessment team.	
Assessment Means of verification	The verifier reviewed the revised MR (IRL 1f) with special focus on: <ol style="list-style-type: none"> <li>the QAL2 and AST information and dates: The information was found to be consistent with QAL2 and AST reports (IRL 7b, 8c)</li> <li>the reported information for instrument TT 45030C: The revised information was found to be consistent with the calibration certificates (IRL 7d)</li> <li>the information about instruments used during this monitoring period for parameter <math>h_n</math>.</li> </ol>	

## List of Findings - Compilation and Resolutions

Project Title: Catalytic N<sub>2</sub>O destruction project at the new nitric acid plant PANNA 4 of Enaex S.A.

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	The information was found to be completed including instruments installed during this monitoring period. Serial number and data of calibration were found to be consistent with the calibration certificates (IRL 7d).	
Changes in the monitoring report or supporting annexes	The information about AST work performed in September 2012 has been revised. The serial numbers and calibration dates have been corrected for instrument TT 45030C Information about instruments replaced/installed during this monitoring period has been added for parameter h <sub>n</sub> .	

## List of Findings - Compilation and Resolutions

Project Title: Catalytic N<sub>2</sub>O destruction project at the new nitric acid plant PANNA 4 of Enaex S.A.

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Clarification Requests by the assessment team		
	Comments and Results	Conclusion and IRL
Issue	The coriolis type mass flow meter and the integrated density measurement deliver values, which are used as basis for calculation of the concentration (taking into consideration the measured temperature of the nitric acid). The nitric acid at 100% is calculated by multiplying the mass flow with the concentration.	<input checked="" type="checkbox"/> This Finding is closed. IRL 9b IRL 10c
Requirement	VVS 17d: In carrying out its validation and verification work, the DOE shall: Assess the accuracy, conservativeness, relevance, completeness, consistency, and transparency of the information provided by project participants	
Clarification Request	<b><u>Clarification Request No. 1</u></b>  The raw data sheet and raw data to calculate HNO <sub>3</sub> concentration shall be provided to the assessment team.	
Response	The raw data sheet with density and temperature raw data to calculate HNO <sub>3</sub> was provided to the assessment team.	
Assessment Means of verification	The verifier reviewed the submitted Excel File "MP3 Nitric acid density and temperature raw data.xls" (IRL 9b). The Excel File was found to include a complete set of density and temperature raw data to calculate HNO <sub>3</sub> . No deficiency was found, the information is consistent with the HNO <sub>3</sub> production (P <sub>NA</sub> ) in the Excel calculation tool (IRL 10c).	
Changes in the monitoring report or supporting annexes	N/A	
Issue	According to PDD the hours of operation are determined by the oxidation Temperature in the AOR.  The temperature is reported automatically by three independent measurement points (TAG numbers TT-45030A – C) measuring the temperature at the same time. The value of the instrument with the TAG number TT-45030A was selected as main signal for monitoring the operation temperature; TT45030B and TT45030C are used as back-up signals in case	<input checked="" type="checkbox"/> This Finding is closed. IRL 9a IRL 10c

## List of Findings - Compilation and Resolutions

Project Title: Catalytic N<sub>2</sub>O destruction project at the new nitric acid plant PANNA 4 of Enaex S.A.

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	<p>TT-45030A is not fully functional.</p> <p>The audit team has crosschecked the results of TT-45030A B and C. During periods from 23/07/2012 to 29/07/2012 and from 28/08/2012 to 04/09/2012 the main instrument deviated significantly from the others. Although during these periods the nitric acid plant was shut down, the three thermocouples should measure about the same temperature, unless maintenance or calibration of instruments.</p>	
Requirement	VVS 17d: In carrying out its validation and verification work, the DOE shall: Assess the accuracy, conservativeness, relevance, completeness, consistency, and transparency of the information provided by project participants	
Clarification Request	<p><b><u>Clarification Request No. 2</u></b></p> <p>Although this is during plant shut down periods, PPs are requested to clarify why the main instrument is used to determine the operating hours in Excel File even it deviates from the other back-up instruments significantly.</p>	
Response	<p>In fact, all three temperature measuring instruments were serviced and maintained during this two scheduled shutdowns. Long scheduled shutdowns are often used for such measures in order to maintain the high levels of availability and reliability during regular plant operation. The maintenance works started well after (17 and 42 hours) the complete shutdown (and cooling) down of the nitric acid plant. Hence, the instruments fulfilled their purpose of determining the operating hours sufficiently. The maintenance works ended well before (26 and 108 hours) the start-up procedures started.</p> <p>Nevertheless, the maintenance works for future shutdowns will be carried out in a way that always at least one temperature measurement is online.</p>	
Assessment Means of verification	The verifier reviewed the clarification from PP and reviewed other plant operating parameters in the Delta-V reports (IRL 9a) e.g. nitric acid production, volumetric flow of tail gas and tail gas pressure. All those parameter clearly shows that the plant shutdown from 23/07/2012 to 29/07/2012 and from 28/08/2012 to 04/09/2012. Hence the hours of operation ( $h_n$ ) used to calculate the emission reductions are found to be correct in the Excel calculation tool (IRL 10c).	
Changes in the monitoring report or supporting annexes	N/A	

## List of Findings - Compilation and Resolutions

Project Title: Catalytic N<sub>2</sub>O destruction project at the new nitric acid plant PANNA 4 of Enaex S.A.

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Forward Action Requests by the assessment team		
	Comments and Results	
Issue	None	
Requirement	N/A	
Forward Action Request	<b><u>Forward Action Request No. 1</u></b>  None	
Response	N/A	
Means of verification	N/A	
Any resulting changes in the monitoring report or supporting annexes	N/A	

## **Annex 2**

### **Information Reference List**




**Project title:** Catalytic N2O destruction project at the new nitric acid plant PANNA 4 of Enaex S.A.” (UNFCCC Ref-Nr. 5393)


**Interviewed Persons during onsite assessment:**

Name	Function	Company
Ricardo Camus R.	CDM Operations Leader	ENAEX S.A.
Hans-Jürgen Salmhofer	CDM Project Engineer	Carbon Climate Protection
Carlos Araneda	Process Engineer	ENAEX S.A.

**Other Interviewed Persons (not during onsite assessment):** none

Information Reference List	Verification of CDM Project	Page 2 of 8	 South Asia
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Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date	Additional Information (Relevance in CDM context)
1	ENAE S.A. TÜV SÜD TÜV NORD	<b><u>Monitoring Report, Project Design Documents, Previous Verification Reports</u></b> <ol style="list-style-type: none"> <li>PDD of the CDM Project “Catalytic N2O destruction project at the new nitric acid plant PANNA 4 of Enaex S.A.” (CDM Registration N° 5393), version 1.2, dated on September 28th, 2011.</li> <li>Validation Report for CDM project “CATALYTIC N2O DESTRUCTION PROJECT AT THE NEW NITRIC ACID PLANT PANNA 4 OF ENAEX S.A.” (Report No: 8000398029 – 11/370) issued by TÜV Nord, dated on 29/11/2011</li> <li>Previous Verification Report, specially the last one</li> <li>Previous Monitoring Reports</li> <li>Monitoring Report version 1 dated on 07/11/2012 (published version)</li> <li>Monitoring Report version 2 dated on 18/12/2012 (final version)</li> </ol>	Various See the left column.	PDD, Validation Report, Monitoring Reports, Verification Reports
2	UNFCCC IPCC	<b><u>References and requirements at UNFCCC</u></b> <ol style="list-style-type: none"> <li>UNFCCC homepage <a href="http://www.unfccc.int">http://www.unfccc.int</a> including the CDM section <a href="http://cdm.unfccc.int/index.html">http://cdm.unfccc.int/index.html</a>.</li> <li>Approved consolidated baseline and monitoring methodology ACM0019 - N2O abatement from nitric acid production, version 01.0.0</li> <li>CDM Project Standard, version 02.0, EB70 Annex2</li> <li>Guidelines for completing the Monitoring Report Form, version 02.0, EB 66Annex 20</li> <li>Tool to determine the mass flow of a greenhouse gas in a gaseous stream, version 02.0.0 Annex 11, EB61</li> <li>CDM Glossary version 05</li> <li>CDM Validation and Verification Standard Version 03.0</li> </ol>	Various See the left column.	UNFCCC Regulative

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Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date	Additional Information (Relevance in CDM context)
4	COREMA, CONAMA, ENAEX S.A.	<u><b>Project Implementation, Licenses</b></u> <ul style="list-style-type: none"> <li>a. Test run Protocol for Panna4 Nitric Acid Plant signed by ENAEX and Tecnicas Reunidas Espindesa 05/11/2011</li> <li>b. Process Data Sheet of R4501 Ammonia Oxidation Reactor of Panna4 Nitric Acid Plant issued by Tecnicas Reunidas, 01 Process Data and 02 Materials rev. 01 dated on 22/09/2006</li> <li>c. Resolución Exenta N° 0121/2006 – permit for the whole complex dated on 29/05/2006 issued by CONAMA</li> <li>d. Data Sheet of AOR Thermocouple TT-45030 A.B.C dated on 27/01/2012</li> <li>e. Secondary Catalyst installation report issued by Heraus dated on 30/11/2011</li> <li>f. Screenshots of the control panel from FoxView (AOR temperature range)</li> <li>g. Commissioning Certificates for TAG's Meters: AT45094 A, AT45094 B, AT45094 C, FT45092, PT45091, PT45095, PT45097, TT45093, TT45096, dated on 13/12/2011</li> <li>h. Print screen of DeltaV screen dated 03/12/2012</li> </ul>	Various See the left column.	
5	ENAEX S.A.	<u><b>Procedures and standards</b></u> <ul style="list-style-type: none"> <li>a. European Standard EN14181 Stationary source emissions - Quality assurance of automated measuring systems dated on July 2004</li> <li>b. "Responsibilities &amp; Operational Project Structure.pdf" version 1.0 issued by ENAEX dated on February 2012</li> <li>c. ISO 9001 Certificate for Planta Prillex America Mejillones Enaex S.A. valid until 29/10/2012</li> <li>d. Procedure DM-MR-CD-027 "Instrumentalist Work procedure", version 1, 03/09/2007</li> <li>e. Procedure DM-MR-CD-080 "Thermocouple Temperature revision", version 1, 03/08/2007</li> </ul>	Various See the left column.	QA/QC Procedures

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Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date	Additional Information (Relevance in CDM context)
		f. Procedure "Analyzer N2O Concentration Calibration" (Not included in ISO) g. Procedure "Gauge pressure Transmitter Calibration" (Not included in ISO)		
6	Endress +Hauser WIKA INOR INECO	<b><u>Monitoring Equipment</u></b> <ol style="list-style-type: none"> <li>Email from Elliot Sanchez Product Manager Flow &amp; EMS Endress +Hauser Chile Ltda regarding recommendations of calibration frequency</li> <li>Manufacturer's declaration, Document number 5006501 regarding Model TC10 issued by WIKA Alexander Wiegand SE &amp; Co. KG</li> <li>Statement from INOR – signed by a Service and Calibration Engineer - regarding stability of Meso-H / Meso HX applications</li> <li>Email from Anibal Gonzales from INECO S.A. regarding recommendations of calibration frequency of PT-45091, TT-45093 and PT-45095.</li> <li>Delta V Print Screen – Version number</li> <li>Statement from INECO dated on May 2012 regarding the hourly average calculation in the Delta-V system</li> <li>Statement from INECO dated on May 2012 regarding recommended calibration frequency of pressure model 2051C and temperature model 3144P transmitters</li> <li>Rosemount 2051 Reference Manual 00809-0100-4101, Rev AA dated on July 2008</li> <li>Rosemount 2051 Reference Manual 00809-0200-4101, Rev AA dated on July 2008</li> </ol>	Various See the left column.	Calibration Requirements Manufacturer
7	Various See the right column.	<b><u>Calibration</u></b> <ol style="list-style-type: none"> <li>FT 45026 and AT45026 Coriolis Flow and density calibration certificate issued by Endress+Hauser Flowtec dated on 09/11/2011</li> <li>AT-45094 and FT-45092 : QAL2 report issued by AIRTEC Date of test 14.12-16.12.2011. Measured objects: FT 45092 (tail gas volume), AT-45094 (N2O concentration), Moisture content, TT 45093 (Tail gas temperature), PT 45091 (Static pressure), PT-45095 (Atmospheric pressure)</li> </ol>	Various See the left column.	Calibration evidences


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Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date	Additional Information (Relevance in CDM context)
		<p>AT-45094: QAL2 report issued by AIRTEC Date of test 04.06-06.06.2012. Measured objects: AT-45094 (N2O concentration),</p> <p>c. TT 45093: Serial number 706088 Temperature Transmitter Calibration Certificate issued by CIDE USACH dated on 16/11/2011</p> <p>d. TT-45030 Thermometers:</p> <p>I. A: Calibration Protocol TE – 45030 A for serial number 3F0AF4X dated on 30/06/2011. Calibration Protocol TE – 45030 A for serial number 1102RY6R dated on 21/07/2012, WIKA Calibration Certificate 00795814 for serial number 1102RY6V dated on 26/10/2011, and Calibration protocol TE – 45030 A for serial number 1102RY6V dated on 29/08/2012.</p> <p>II. B: Calibration protocol TE – 45030 B for Serial No. 3F0AF4Y dated on 30/06/2011. Calibration Protocol TE – 45030 B for serial number 1102RY6P dated on 22/07/2012.</p> <p>III. C: Calibration Protocol TE – 45030 C for serial number 3F0AF4W dated on 30/06/2011. Calibration Protocol TE – 45030 C for serial number 1102RY6S dated on 22/07/2011, WIKA Calibration Certificate 00795811 for serial number 1102RY6Q dated on 30/06/2011, and Calibration protocol TE – 45030 C for serial number 1102RY6Q dated on 31/08/2012.</p> <p>e. TT-45050 - Certificate issued by ENAEX for HNO3 Temperature Transmitter (Manufacturer: Inor; Model: Meso-H) Serial Number N0809.842183/VO336261 dated on 30/11/2011</p> <p>f. PT-45091 ,  Calibration Protocol for TAG PT-45091, issued by ENAEX S.A., dated on 10/06/2012  Calibration Protocol for TAG PT-45091, issued by ENAEX S.A., dated on 09/07/2012  Calibration Certificate for TAG PT-45091, issued by CESMEC S.A., dated on 08/08/2012</p>		

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Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date	Additional Information (Relevance in CDM context)
		<p>Calibration Protocol for TAG PT-45091, issued by ENAEX S.A., dated on 07/09/2012</p> <p>g. PT-45095  Calibration protocol for TAG PT-45095, issued by ENAEX S.A., dated on 10/06/2012  Calibration Protocol for TAG PT-45095, issued by ENAEX S.A., dated on 09/07/2012  Calibration Protocol for TAG PT-45095, issued by ENAEX S.A., dated on 08/08/2012  Calibration Protocol for TAG PT-45095, issued by ENAEX S.A., dated on 07/09/2012.</p> <p>h. Calibration Certificate issued for primary devices used to calibrate PT-45091 and PT-45095. Calibration certificate number 2011-0861 dated on 17/02/2011 and calibration certificate Nr. 2011-0874 both issued by Desarrollo de Tecnologias y sistemas (DTS)</p>		
8	ENAEX S.A. AIRTEC EMERSON	<p><b><u>Other Regular Maintenance other than Calibration</u></b></p> <p>a. Shewhart Control Chart, excel file with graphs of span and zero calibration values of N2O analyser for this monitoring period.</p> <p>b. AT45094: QAL1 certificate MLT1 MLT2 of NGA Series issued by TÜV Rheinland Group dated on 16/02/1999</p> <p>c. AST Report (12-200_AST report 2012- Panna 4_ENAEX_Rev0 (2).pdf), date of test 24 – 25/09/2012 issued by Airtec.</p>	Various See the left column.	
9	ENAEX S.A.	<p><b><u>Data Measured and Recorded</u></b></p> <p>a. Delta V csv and mdi files (daily and monthly) for the monitoring period.</p> <p>b. HNO3 density and temperature 1-second data for this monitoring period exported from DCS to Excel file</p> <p>c. HNO3 mass flow and concentration hourly data this monitoring period exported from Delta V to Excel file</p>		

Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date	Additional Information (Relevance in CDM context)								
10	ENAEX S.A.	<b><u>Calculation Spreadsheet and Tool</u></b> a. Spreadsheet of Calculation of Emission Reductions “MP 3_PANNA 4 (5393)_UNFCCC SUMMARY_v1 07-11-12_confidential.xlsx” version 1 dated on 07/11/2012 b. Spreadsheet of Calculation of Emission Reductions “MP 3_PANNA 4 (5393)_UNFCCC SUMMARY_v1 RAW DATA” version 1 dated on 05/10/2012 c. Spreadsheet of Calculation of Emission Reductions “MP 3_PANNA 4 (5393)_UNFCCC SUMMARY_v2 18-12-12_confidential.xlsx version 2 dated on 18/12/2012	Various See the left column									
11	ENAEX S.A.	<b><u>Special Events</u></b> a. Secondary Catalyst System Inspection and Installation Report, performed by Heraeus on 23/07/2012. Attached with images of the catalyst failure. b. Photos from secondary catalyst taken on 25/07/2012	Various See the left column.									
12	ENAEX S.A	<b><u>Cross-Checking LogBooks Checklists</u></b> a. Weekly Checklist of Panna4 CDM Project instruments for this monitoring period. b. Production Data “Listado de Producciones Diarias Planta Prillex América” c. Raw data Check performed by ENAEX (Cross check MP2 Raw.) d. Daily LogBook for this monitoring period. e. Real Time measurements and charts, taken on-site.	Various See the left column.									
13	Praxair	<b><u>Primary Gauzes, Other External Data</u></b> a. Analyzer test gas certificates (zero gas, span gas used in this monitoring period) issued by Praxair S.A. <table><tr><th>Cyl No</th><th>Composition</th><th>Filled</th><th>Expired</th></tr><tr><td></td><td></td><td></td><td></td></tr></table>	Cyl No	Composition	Filled	Expired					Various See the left column.	
Cyl No	Composition	Filled	Expired									

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Ref. No.	Author/Edit or/ Issuer	Title/Type of Document. Publication place						Issuance and/or submission date	Additional Information (Relevance in CDM context)
			CC330059	N2 99.999%	21/12/2010	--			
			CC312768	N2O 168ppm	30/11/2011	30/11/2013			
			CC99722	N2 99.999%	14/03/2012	--			
14	ENAEX S.A. Carbon Climate Protection	<u>Trainings</u> a. Signed List of Participants for Gas Analyzer Training (12/01/2012) held by Daniel Rojas Gas Analyser Specialist from INECO S.A. b. Signed List of Participants for Delta V Training (12-13/01/2012) held by Pablo Saez Delta V Specialist from INECO S.A. c. Information on internal WebEx Trainings held by Carbon Climate Protection						Various See the left column.	Personnel trainings



## **Annex 3**

### **Appointment Certificates**



South Asia

# CERTIFICATE OF APPOINTMENT

Mr. Hammer, Martin fulfills the requirements of the Certification Body "Environment and Energy" of TÜV SÜD South Asia Pvt Ltd to participate in audits.

Qualification applicable to					
Standard	CDM	GS	VCS	VER	Other
Date	23.03.12				

Qualification as						
Status	Trainee	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date		23.03.12	23.03.12	23.03.12	23.03.12	1.2, 4.9, 5.1, 11.1, 12.1

Other qualification						
Country Expertise						
Region	1	2	3	4	5	Other
Date	23.03.12					
Further countries						
Financial Expertise						
Date	23.03.12					

Qualification in technical areas	
Technical Area	Date
1.2_Energy generation from renewable energy source	23.03.12
5.1_4.9_11.1_12.1_Chemical process industries	23.03.12

This appointment is valid until 28.02.2013 and is bound by internal requirements of the Certification Body "Environment and Energy" of TÜV SÜD South Asia Pvt Ltd.

In case of loss of validity of this certificate as per result of an assessment according to internal procedures or due to any other reason, it will be properly communicated to you.

Your Certificate has the internal reference no. CB-IND-CCP-0017/001.

Date	Signature
18.12.2012: Extension of Validity	





South Asia

## CERTIFICATE OF APPOINTMENT

Mr. Saldias Kiefer, Lester fulfills the requirements of the Certification Body "Environment and Energy" of TÜV SÜD South Asia Pvt Ltd to participate in audits.

Qualification applicable to					
Standard	CDM	GS	VCS	VER	Other
Date	07.04.12				

Qualification as						
Status	Trainee	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date		07.04.12	07.04.12			1.2, 13.1

Other qualification						
Country Expertise						
Region	1	2	3	4	5	Other
Date	07.04.12	07.04.12				
Further countries						
Financial Expertise						
Date						

Qualification in technical areas	
Technical Area	Date
1.2_Energy generation from renewable energy source	07.04.12
13.1_Waste handling and disposal	07.04.12

This appointment is valid until 28.02.2013 and is bound by internal requirements of the Certification Body "Environment and Energy" of TÜV SÜD South Asia Pvt Ltd.

In case of loss of validity of this certificate as per result of an assessment according to internal procedures or due to any other reason, it will be properly communicated to you.

Your Certificate has the internal reference no. CB-IND-CCP-0059/001.

Date	Signature
21.11.2012: Extension of Validity	





South Asia

## CERTIFICATE OF APPOINTMENT

Mr. Tollio Vanhaz, Dante Luis fulfills the requirements of the Certification Body "Environment and Energy" of TÜV SÜD South Asia Pvt Ltd to participate in audits.

Qualification applicable to					
Standard	CDM	GS	VCS	VER	Other
Date	23.03.12				

Qualification as						
Status	Trainee	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date						4.9, 5.1, 11.1, 12.1

Other qualification						
Country Expertise						
Region	1	2	3	4	5	Other
Date		23.03.12				
Further countries						
Financial Expertise						
Date						

Qualification in technical areas	
Technical Area	Date
5.1_4.9_11.1_12.1_Chemical process industries	23.03.12

This appointment is valid until 28.02.2013 and is bound by internal requirements of the Certification Body "Environment and Energy" of TÜV SÜD South Asia Pvt Ltd.

In case of loss of validity of this certificate as per result of an assessment according to internal procedures or due to any other reason, it will be properly communicated to you.

Your Certificate has the internal reference no. CB-IND-CCP-0058/001.

Date	Signature
21.11.2012: Extension of Validity	





South Asia

# CERTIFICATE OF APPOINTMENT

Mr. Tausche, Konrad fulfills the requirements of the Certification Body "Environment and Energy" of TÜV SÜD South Asia Pvt Ltd to participate in audits.

Qualification applicable to					
Standard	CDM	GS	VCS	VER	Other
Date	30.03.12				

Qualification as						
Status	Trainee	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date		30.03.12	30.03.12	30.03.12	30.03.12	1.1, 4.9, 4.10, 5.1, 11.1, 12.1, 13.1

Other qualification						
Country Expertise						
Region	1	2	3	4	5	Other
Date	30.03.12					
Further countries						
Financial Expertise						
Date	30.03.12					

Qualification in technical areas	
Technical Area	Date
1.1_4.10_Thermal energy generation.....	30.03.12
5.1_4.9_11.1_12.1_Chemical process industries	30.03.12
13.1_Waste handling and disposal	30.03.12

This appointment is valid until 28.02.2013 and is bound by internal requirements of the Certification Body "Environment and Energy" of TÜV SÜD South Asia Pvt Ltd.

In case of loss of validity of this certificate as per result of an assessment according to internal procedures or due to any other reason, it will be properly communicated to you.

Your Certificate has the internal reference no. CB-IND-CCP-0042/001.

Date	Signature
21.11.2012: Extension of Validity	