




Verification and certification report form for CDM project activities

(Version 01.0)

VERIFICATION AND CERTIFICATION REPORT

Title of the project activity	Catalytic N ₂ O destruction project at the new nitric acid plant PANNA 4 of Enaex S.A.
Reference number of the project activity	5393
Version number of the verification and certification report	version 02.0
Completion date of the verification and certification report	23/05/2016
Monitoring period number and duration of this monitoring period	Monitoring Period 07 01/01/2015 to 31/12/2015
Version number of monitoring report to which this report applies	version 2
Crediting period of the project activity corresponding to this monitoring period	Type: fixed Start date: 19/12/2011 Length: 10 years
Project participant(s)	Enaex S.A. (contractor) Carbon Climate Protection GmbH Mitsubishi Corporation Nordic Environment Finance Corporation
Host Party	Republic of Chile
Sectoral scope(s), selected methodology(ies), and where applicable, selected standardized baseline(s)	Scope 05 Methodology ACM0019; Version 02.0
Estimated GHG emission reductions or net anthropogenic GHG removals for this monitoring period in the registered PDD	283,302 tCO ₂ e
Certified GHG emission reductions or net anthropogenic GHG removals for this monitoring period	45,157 tCO ₂ e
Name of DOE	TÜV SÜD South Asia Pvt Ltd
Name, position and signature of the approver of the verification and certification report	 Eswar Murty Sr. Manager, Certification Body, TÜV SÜD South Asia

SECTION A. Executive summary

TÜV SÜD South Asia Pvt. Ltd. has performed the 7th 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 verification process includes three phases:

- Desk review of documents;
- On-site audit and follow-up interviews with the relevant personnel;
- Resolution of outstanding issues and the issuance of final verification report and opinion.

This project consists of a secondary N₂O abatement catalyst installed in the ammonia oxidation reactor of new the nitric acid at the PANNA 4 plant of Enaex S.A. which has been commissioned in November 2010.

The details of the location of the project are:

Country: The Republic of Chile

Region: Antofagasta

City: Mejillones

GPS coordinates: -23.097400 , -70.430153

1 Clarification Requests (CLs) and 4 Corrective Action Request (CAR) were raised during the course of this verification process and have been successfully closed. 0 Forward Action Request (FAR) was raised during this monitoring period.

TÜV SÜD conducted the verification on the basis of the monitoring methodology "Methodology ACM0019, Version 02.0", registered PDD (version 1.4 dated on 17/09/2014), validation report and the monitoring report (version 2) dated 27/04/2016, emission reduction spreadsheets and all the supporting documentation made available to us.

TÜV SÜD confirms that the project is implemented as described in the validated and registered project design documents. Based on the information we have assessed, we confirm that the GHG emission reductions are calculated without material misstatements in a conservative and appropriate manner.

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

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)	Involvement in			
						Desk review	On-site inspection	Interview(s)	Verification findings
1.	Team Leader	EI	Hammer	Martin	TÜV SÜD Industrie Service GmbH	X		X	X
2.	Verifier	EI	Castro	Javier	TÜV SÜD Industrie Service GmbH		X	X	

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	EI	Tausche	Konrad	TÜV SÜD Industrie Service GmbH
3.	Approver	IR	Murty	Eswar	TÜV SÜD South Asia (Central office)

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.	Human errors Human error is likely to occur if the monitoring personnel are not well trained or inexperienced in data recording procedures and monitoring processes.	Low	The monitoring personnel are well trained and very experienced.	No specific verification plan is required.
2	Design of data management Use of spreadsheets without adequate data control, changes/updates, version tracking, traceability and	Low	Procedures for quality control are available and well known by the responsible personnel. The data management system is based on digital transfer of information between the	Emphasis is given to verify data that is manually changed in order to comply with the requirements of the methodology. The correct transfer of information from

	security		different equipment and the central server. The data is downloaded from the server into the calculation sheets.	the server to the excel sheets is verified.
3	Manual data Typographic errors in the spreadsheets and log books while recording.	Low	The Excel Calculation Sheets and the underlying procedures are very well developed	The formulae for the calculations are thoroughly checked to assure no typographic errors occurred. All calibration dates and equipment characteristics are thoroughly verified.

C.2. Consideration of materiality in conducting the verification

The verification is based on the materiality threshold of 2% for CERs/year < 300000.

The threshold value is consequently 903 tCO₂e.

The difference between the initial reported CERs and the reported CERs after closing the findings is 980 tCO₂e. This is slightly above the materiality threshold. The assessment team analysed the circumstances. Thus, the main impact on the difference was due to the changes required for CAR03. In order to resolve this finding PPs have manually changed the data of h_y in the Excel Calculation Sheet because of the malfunction of the main thermocouple. This error was isolated and not systematic. The level of assurance of these relevant monitoring parameters (h_y and h_{ry}) is considered as high due to the parallel AOR thermocouples installed and the crosscheck of plant operation using other monitoring parameters i.e.: $V_{t,db}$, $v_{t,db}$ or $P_{production,y}$.

SECTION D. Means of verification

D.1. Desk review

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.

The list of all documents reviewed or referenced during the verification is provided in Appendix 3 below.

D.2. On-site inspection

Duration of on-site inspection: 06/04/2016				
No.	Activity performed on-site	Site location	Date	Team member
1	Inspection of the Panna4 plant	Panna4 plant site	06/04/2016	Castro Javier
2	Inspection of the CDM relevant measuring devices at the Panna4 plant site	Panna4 plant site	06/04/2016	Castro Javier
3	Inspection of the control room	Panna4 plant site	06/04/2016	Castro Javier
4	Inspection of the analyser room	Panna4 plant site	06/04/2016	Castro Javier
5	Interviews Daily Events and Special Events	Meeting Room	06/04/2016	Castro Javier
6	Data Review	Meeting Room	06/04/2016	Castro Javier
7	Interviews Calibration	Meeting Room	06/04/2016	Castro Javier

D.3. Interviews

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1.	Araneda	Carlos	Process Engineer (ENAEX)	06/04/2016	HNO ₃ production, Daily Events, Instruments, Calibration Certificates, Excel Calculation, Monitoring Report	Castro Javier
2	Bichler	Sonja	Project Manager (CCP)	06/04/2016 via Internet Conference	HNO ₃ Production, Daily Events, Instruments, Calibration Certificates, Excel Calculation, Monitoring Report	Castro Javier

D.4. Sampling approach

No sampling approach is applicable for this project.

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

Areas of verification findings	No. of CL	No. of CAR	No. of FAR
Compliance of the monitoring report with the monitoring report form	0	0	0
Compliance of the project implementation with the registered PDD	1 (CL 01)	0	0
Post-registration changes	0	0	0
Compliance of the monitoring plan with the monitoring methodology including applicable tool and standardized baseline	0	0	0
Compliance of monitoring activities with the registered monitoring plan	0	2 (CAR 03, CAR 04)	0
Compliance with the calibration frequency requirements for measuring instruments	0	1 (CAR 02)	0
Assessment of data and calculation of emission reductions or net removals	0	0	0
Others (please specify): Editorial Issues		1 (CAR 01)	
Total	1	4	0

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

Means of verification	TÜV SÜD has checked the monitoring report provided by the PP against the latest monitoring report form in order to determine, whether the monitoring report is in compliance with it.
Findings	CL01 has been raised due to differences in the information regarding PP contact details.
Conclusion	As per p.382 of VVS v9.0, the DOE confirms that the compliance of the monitoring report with the relevant form and instructions therein.

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

The verification team confirms that there are no remaining FARs from validation or previous verifications.

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

Means of verification	The audit team has visually inspected all physical features (technology, project equipment, and monitoring and metering equipment) of the project activity. In addition the process visualization available in the plant's control has been inspected and compared with the project description described in the PDD.
Findings	No CL/CAR/FAR raised here.
Conclusion	As per p.384 of VVS v9.0, the DOE by means of an on-site inspection assessed that all physical features (technology, project equipment, and monitoring and metering equipment) of the registered CDM project activity are in place and that the project participants have operated the project activity as per the registered PDD.

E.4. Post-registration changes**E.4.1. Temporary deviations from the registered monitoring plan, monitoring methodology or standardized baseline**

N/A

E.4.2. Corrections

N/A

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

N/A

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

N/A

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

No such changes have been occurred during this monitoring period.

Already before this monitoring period a permanent change from registered monitoring plan has been approved on 22/10/2014. The issue of this change was the switch from version 01.0 to version 02.0 of ACM0019.

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

N/A

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

N/A

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

Means of verification	The verification team has checked the actual monitoring plan against the registered monitoring plan and monitoring methodology. Furthermore the verification team has checked monitoring system during the onsite inspection by means of comparison with the information given in the monitoring plan and monitoring methodology. The applicable tool (IRL 2c) is correctly applied in the monitoring system.
Findings	No CL/CAR/FAR raised here.
Conclusion	The monitoring plan complies with the applied methodology and the monitoring system and all applied procedures are completely in compliance to the registered monitoring plan and the methodology including their tool.

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**

Means of verification	Data and parameters fixed ex-ante as listed in the monitoring report have been crosschecked and reviewed as applicable against the registered PDD (Version 1.4 , 17/09/2014) as well as against the applied methodology (ACM0019 version 02.0) and other relevant CDM related documentation.	
	Data / Parameter:	EF _{new,y}
	Data unit:	kgN ₂ O/tHNO ₃
	Description:	Baseline N ₂ O emission factor for nitric acid production in year y (related to 100 per cent pure acid)
	Source of data used:	According to PDD and ACM0019 version 02.0.0
	Means of verification/Comments:	The applied emissions factors have been compared with the default value given in the PDD and applied methodology. The correct values are applied.
	Cross-check	Not applicable
	Data / Parameter:	GWP _{N₂O}
	Data unit:	tCO ₂ e/tN ₂ O
	Description:	Global warming potential of N ₂ O valid for the commitment period
	Source of data used:	According to PDD - Relevant decisions by the CMP
	Means of verification/Comments:	The applied value is in accordance with "Standard for application of the global warming potentials to CDM project activities and PoAs for the second commitment period of the Kyoto Protocol (version 01.0)"
	Cross-check	Not applicable
	Data / Parameter:	R _u
	Data unit:	Pa.m ³ /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"
	Means of verification/Comments:	The applied value has been compared with the default value given in the PDD and applied methodology and tool. The correct value is applied.
	Cross-check	Not applicable

	Data / Parameter:	MM _i
	Data unit:	kg/kmol
	Description:	Molecular mass of N ₂ O
	Source of data used:	According to PDD and "Tool to determine the mass flow of a greenhouse gas in a gaseous stream"
	Means of verification/Comments:	The applied value has been compared with the default value given in the PDD and applied methodology and tool. The correct value is applied.
	Cross-check	Not applicable
Findings	No CL/CAR/FAR raised here.	
Conclusion	TÜV SÜD confirms that all default values are explicitly mentioned in the monitoring report and have been correctly and consistently applied. All values are in compliance with relevant documentation such as the registered PDD as well as the applied methodology and other CDM related documentation, where applicable.	

E.6.2. Data and parameters monitored

Means of verification	
	Data / Parameter:
	P _{production,y}
	Data unit:
	tHNO ₃
	Description:
	Production of nitric acid in year y
	Source of data used:
	The coriolis type mass flow meter and the integrated density measurement device 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. The 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).
	Means of verification/Comments:
	Data provided in the raw data sheet and raw data to calculate HNO ₃ concentration (IRL 9b) 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. DeltaV Monthly reports (.mdi-files) (IRL 9a) were used to verify correct transfer of raw data to the Excel Tool.
	Cross-check
	PPs provided daily production data for this monitoring period "Listado de Producciones Diarias Planta Prillex América" (IRL 9c) 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 be in a reasonable range. In addition the calculation of HNO ₃ concentration (based on density and temperature of HNO ₃ produced) has been crosschecked with empirical values of HNO ₃ temperature, density and concentration. 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 to see the overall integrity of oxidation temperature. The nitric acid plant has a designed capacity (= nameplate capacity) of 925 mtpd HNO ₃ (100%) according to PDD. This has been confirmed by the plant supplier Técnicas Reunidas (IRL 4i). Further, it has also been confirmed by the plant supplier that reserves were necessarily incorporated during plant design. The actual capacity shall be understood as exploitation of state-of-the-art reserves in the plant design. The highest daily production rate during this period did not exceed the design margins mentioned by the plant supplier (IRL 4i).

Data / Parameter:	h_y
Data unit:	h
Description:	Number of hours of operation in year y
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; TT-45030B and TT-45030C 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>
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. The values were found to be consistent over the period except to the periods of problems of the main instrument 45030A and the data from backup-instrument have been used.</p>

Data / Parameter:	$h_{r,y}$
Data unit:	h
Description:	Number of hours (h) in year y where for secondary any N ₂ O abatement: abatement system was not installed, underperformed or failed
Source of data used:	<p>This parameter is determined by applying “Case 2” for the calculation of $h_{r,y}$ defined in the applied methodology. “Case 2” is applicable as the project has never applied the methodologies AM0028 or AM0034. Thus the relevant monitoring parameters for determining $h_{r,y}$ are:</p> <p> $F_{N_2O, tail\ gas, h}$ → Monitoring Parameters $V_{t,db}$ $V_{i,t,db}$ $C_{H_2O,t,db,n}$ $P_{NA,h}$ → Monitoring Parameter $P_{production,y}$ $EF_{new,y}$ → fixed ex ante </p>
Means of verification/Comments:	<p>The verifier has checked the compliance of the calculation applied with the defined equation in the methodology.</p> <p>For the means of verification of the underlying parameters refer to the table of the relevant monitoring parameter.</p>
Cross-check	n/a: For the crosscheck of the underlying parameters please refer to the table of the relevant monitoring parameter.

Data / Parameter:	$V_{t,db}$
Data unit:	m ³ dry gas/h
Description:	Volumetric flow of the gaseous stream in time interval t on a dry basis
Source of data used:	The total gas volume is continuously measured by a DURAG DFL 100 DS and automatically recorded in the Delta V system and the data is provided as hourly averages in Excel sheet which is derived from Delta V system (csv.files).
Means of	Data provided in the raw data sheet were traced by the verifier with the

verification/Comments:	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. The 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.

Data / Parameter:	$V_{i,t,db}$
Data unit:	m ³ gas i/m ³ dry gas
Description:	Volumetric fraction of greenhouse gas i in a time interval t on a dry basis
Source of data used:	The volumetric fraction of N ₂ O is continuously measured by a non-dispersive infrared photometry for N ₂ 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).
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. In regard to applied default values in case measurement data are not available, the verifier confirms that the procedure according to the applied methodology is correctly applied.
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 ₂ O concentration. The data were found to be plausible.

Data / Parameter:	T_t
Data unit:	K
Description:	Temperature of the gaseous stream in time interval t
Source of data used:	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).
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.
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 ₂ O concentration. The data were found to be plausible.

	Data / Parameter:	P_t
	Data unit:	Pa
	Description:	Pressure of the gaseous stream in time interval t
	Source of data used:	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). DeltaV Monthly reports (.mdi-files) (IRL 9a) were used to verify correct transfer of raw data to the Excel Tool.
	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. 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 10b).
	Cross-check	In order to ensure the integrity of the data, the verification team reviewed the series of hourly data of static pressure 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_2O concentration. The data were found to be plausible except from 15.06.2015 11:00 and 06.08.2015 12:00 (refer to CAR 04).
	Data / Parameter:	$C_{H_2O,t,db,n}$
	Data unit:	mg H_2O / m^3 dry gas
	Description:	Moisture content of the gaseous stream at normal conditions, in time interval t
	Source of data used:	Measurements according to USEPA CF 42 method 4 – Gravimetric determination of water content (QAL2 or AST Report).
	Means of verification/Comments:	Option A of the tool can be applied, as the moisture content is less than 0.05 kg H_2O/m^3 dry gas. The highest measured value according to AST report from 2015 (IRL 8c) is 0.0022 kg H_2O / m^3 dry gas (= 2,200 mg H_2O/m^3 dry gas) and the highest value according to latest QAL2 report (IRL 7b) is 0.0028 kg H_2O/m^3 dry gas (= 2,800 mg H_2O/m^3 dry gas).
	Cross-check	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_2O/m^3 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_2O.</i> The moisture content measured during AST by third party is in compliance with the observations of validating DOE.
Findings	The corrective action requests (CAR 03, CAR 04) were closed. For details refer to the respective tables in Appendix 4.	
Conclusion	TÜV SÜD confirms that the monitoring of all the parameters has been carried out in accordance with the registered monitoring plan and all the monitoring activities comply with it. The CAR/CR has been closed successfully.	

E.6.3. Implementation of sampling plan

Means of verification	N.A.
Findings	No CL/CAR/FAR raised here.
Conclusion	N.A.

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

Means of verification	The audit team has checked the calibration certificates and records of the monitoring equipment as given below:	
Data / Parameter:	$P_{\text{production},y}$	
Location / TAG Nr. / Serial Nr and evidence of calibration	<p>Nitric acid line / FT-45026 / E8078D16000 IRL 7a</p> <p>Nitric acid line / FT-45026 / JB037416000 IRL 7a</p> <p>Nitric acid line / TT-45050 / N0809.842183/VO336261 IRL 7e</p> <p>The equipment used has been calibrated according to the requirements specified by the approved monitoring plan of the revised 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 some calibration activities were delayed (IRL 7a). Due to this delay on the calibrations the procedure defined in §395 from the VVS has been correctly applied in order to correct the measured values. It is confirmed that the error has been applied:</p> <p>(a) in a conservative manner, such that the adjusted measured values of the delayed calibration result in fewer claimed emission reductions;</p> <p>(b) for all measured values taken during the period between the scheduled date of calibration and the actual date of calibration.</p>	
Data / Parameter:	h_y	
Location / TAG Nr. / Serial Nr and evidence of calibration	<p>Ammonia oxidation reactor / TT-45030A / 1104NO00 and 1104N2S1 IRL 7d</p> <p>Ammonia oxidation reactor / TT-45030B / 1104NC5E and 1107GTB8 IRL 7d</p> <p>Ammonia oxidation reactor / TT-45030C / 1104NC5D and 1107GTB6 IRL 7d</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>	
Data / Parameter:	$h_{r,y}$	
Location / TAG Nr. / Serial Nr and evidence of calibration	<p>This parameter is determined by applying Case 2 for the calculation of $h_{r,y}$ defined in the applied methodology. Case 2 is applicable as the project has never applied AM0028 or AM0034.</p> <p>Thus the relevant monitoring parameters for determining $h_{r,y}$ are:</p> <p>$F_{\text{N}_2\text{O},\text{tail gas},h} \rightarrow$ see Monitoring Parameters $V_{t,\text{db}}, V_{i,t,\text{db}}, C_{\text{H}_2\text{O},t,\text{db},n}$</p> <p>$P_{\text{NA},h} \rightarrow$ see Monitoring Parameter $P_{\text{production},y}$</p> <p>$EF_{\text{new},y} \rightarrow$ fixed ex ante</p>	
Data / Parameter:	$V_{t,\text{db}}$	
Location / TAG Nr. / Serial Nr and evidence of calibration	<p>Stack / FT-45092 / 265DS6600071043 IRL 7b</p> <p>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_2O concentration and the volume flow of the tail gas. The QAL2 parameters are applied to the calculated hourly</p>	

	averages as part of the calculation of project emissions in the Excel calculation tool. This is in accordance with the applied methodology. The QAL2 reports (IRL 7b) was provided as evidence of the calibration work performed. Hence it is confirmed that calibration was not delayed. In addition the AST was performed in accordance with the applicable standard EN14181 by an accredited third party institute.
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Data / Parameter:	$V_{i,t,db}$
Location / TAG Nr. / Serial Nr and evidence of calibration	<p>Stack / AT-45094C / 3709103038248 IRL 7b</p> <p>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-tests in accordance with EN14181 are applied to both the N₂O 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. This is in accordance with the applied methodology. The QAL2 reports (IRL 7b) provided as evidence of the calibration work performed. Hence it is confirmed that calibration was not delayed.</p>

Data / Parameter:	T_t
Location / TAG Nr. / Serial Nr and evidence of calibration	<p>Stack / TT-45093 / 706088 IRL 7c</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). The calibration certificate (IRL 7c) was provided as evidence of the calibration work performed.</p> <p>Hence it is confirmed that some calibration activities were delayed. Due to this delays on the calibrations the procedure defined in §395 from the VVS has been correctly applied in order to correct the measured values. It is confirmed that the error has been applied:</p> <p>(a) in a conservative manner, such that the adjusted measured values of the delayed calibration result in fewer claimed emission reductions;</p> <p>(b) for all measured values taken during the period between the scheduled date of calibration and the actual date of calibration</p>

Data / Parameter:	P_t
Location / TAG Nr. / Serial Nr and evidence of calibration	<p>Stack / PT-45091 / 58154 IRL 7f</p> <p>Stack / PT-45095 / 58157 IRL 7g</p> <p>The equipment used has been calibrated according to the requirements as specified by the applied methodology (i.e. the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream") and according to the requirements of the manufacturer's specification (IRL 6d). The calibration certificates (IRL 7f, IRL 7g) were provided as evidence of the calibration work performed.</p> <p>Hence it is confirmed that some calibration activities were delayed. Due to this delays on the calibrations the procedure defined in §395 from the VVS has been correctly applied in order to correct the measured values. It is confirmed that the error has been applied:</p> <p>(a) in a conservative manner, such that the adjusted measured values of the delayed calibration result in fewer claimed emission reductions;</p> <p>(b) for all measured values taken during the period between the scheduled date of calibration and the actual date of calibration</p>

Findings	The corrective action request (CAR 02) was closed. For details refer to the respective tables in Appendix 3.
Conclusion	TÜV SÜD confirms that the calibrations are conducted at the frequency as specified by the methodology and the monitoring plan or data has been corrected according to the requirements.

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

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

Means of verification	The assessment of data and the calculation of baseline emissions in the MR and the CER excel sheet have been verified as per the following set of supporting documents: Excel Calculation Tool (IRL 10b), Raw data (IRL 9a and IRL 9b), Nitric Acid Production Records (IRL 9c).
Findings	No CL/CAR/FAR raised here.
Conclusion	The calculation of baseline emissions is correct. Further, the information provided in the monitoring report has been cross-checked with other sources such as tail gas flow, production reports, etc. to confirm the correctness and for plausibility check. The calculation of baseline GHG emissions have been carried out in accordance with the formulae and methods described in the registered monitoring plan and the applied methodology. Any assumptions used in emission or removal calculations have been justified. Appropriate emission factor, IPCC default values, GWPs and other reference values have been correctly applied.

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

Means of verification	The assessment of data and the calculation of project emissions in the MR and the CER excel sheet have been verified as per the following set of supporting documents: Excel Calculation Tool (IRL 10b), Raw data (IRL 9), QAL2 Reports (IRL 7b).
Findings	No CL/CAR/FAR raised here.
Conclusion	The calculation of project emissions is correct. Further the information provided in the monitoring report has been cross-checked with other sources such as HNO ₃ production, redundant instruments to confirm the correctness and for plausibility check. The calculation of baseline GHG emissions have been carried out in accordance with the formulae and methods described in the registered monitoring plan and the applied methodology. Any assumptions used in emission or removal calculations have been justified. Appropriate emission factor, IPCC default values, GWPs and other reference values have been correctly applied.

E.8.3. Calculation of leakage GHG emissions

Means of verification	According to the applied methodology (ACM0019 version 2.0) no leakage emissions sources has to be considered.
Findings	N/A
Conclusion	N/A

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

Means of verification	<p>No lack of evidence and missing data were detected during this monitoring period. All values as per the monitoring plan were crosschecked by the verification team against basic monitored data and the calculations were found to be correct. The verification team confirms that all assumptions, emission factors and default values have been correctly justified. All the emission factors, application of maximum permissible errors and default values are explicitly mentioned in the monitoring report. Hence the DOE confirms that the methods and formulae used to obtain the emissions are appropriate.</p> <p>No reporting risks have been identified for the data reported. Troubleshooting procedure, maintenance and calibration of monitoring equipments, monitoring measurements and reporting, record handling and maintenance, reviewing</p>
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	<p>monitored data are available at the plant. All the monitored data are archived partially in electronic and paper form. The data will be kept for the whole crediting period and 2 years after the last crediting period thereby meeting the requirement of the monitoring plan.</p> <p>Verified emission reductions in this monitoring period: 45,157 tCO_{2e}</p> <p>Baseline emissions: 178,556 tCO_{2e} Project emissions: 133,399 tCO_{2e} Leakage emissions: 0tCO_{2e}</p>
Findings	No CL/CAR/FAR raised here.
Conclusion	The verification team confirms that the emission reductions are real and measurable. The verification team also confirms that there is no material misstatement in the calculation of reported emission reductions. The calculations of baseline emissions, project emissions and leakage as appropriate have been carried out in accordance with the formulae and methods described in the revised monitoring plan and the applied methodology document.

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

Means of verification	TÜV SÜD compared the ex-ante estimation of emission reductions in the registered PDD with the emission reductions reported by the PPs in the monitoring report.
Findings	No CL/CAR/FAR raised here.
Conclusion	The amount of emission reductions achieved during this monitoring period is lower than the estimation in the PDD. 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.

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

Means of verification	The amount of emission reductions achieved during this monitoring period is lower than the estimation in the PDD
Findings	Not applicable.
Conclusion	Not applicable.

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

Means of verification	The reported GHG emission reductions reported in the monitoring report for this monitoring period have been achieved only in the period from 1 January 2013 onwards. As described in detail in Section E of this report, all relevant aspects of the project activity have been assessed in order to determine, whether the claimed emission reductions by the PPs are correctly determined, reasonable and fairly stated and based on verifiable evidence and in accordance with the applied methodology, the registered PDD and the monitoring plan.
Findings	No CL/CAR/FAR raised here.
Conclusion	<p>The reported GHG emission reductions during the first commitment period: 0 tCO_{2e}</p> <p>The reported GHG emission reductions from 01 January 2013: 45,157 tCO_{2e}</p> <p>TÜV SÜD confirms that the GHG emission reductions reported in the monitoring report and claimed by the PPs are correctly determined for the covered verification period from 1 January 2013 onwards.</p>

SECTION F. 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 Certification Body.

SECTION G. Verification opinion

The DOE confirms 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 monitoring plan in Monitoring Report is as per the PDD and monitoring plan approved by the EB;
- the approved 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:	45,157 tCO _{2e}
Baseline emissions:	178,556 tCO _{2e}
Project emissions:	133,399 tCO _{2e}
Leakage emissions:	0tCO _{2e}

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

SECTION H. Certification statement

TÜV SÜD South Asia Pvt. Ltd. has performed the 7th periodic verification CDM project activity “Catalytic N₂O destruction project at the new nitric acid plant PANNA 4 of Enaex S.A.”. 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

TÜV SÜD conducted the verification on the basis of the monitoring methodology “Methodology ACM0019, Version 02.0”, registered PDD (version 1.4 dated on 17/09/2014), validation report and the monitoring report (version 2) dated 27/04/2016, emission reduction spreadsheets and all the supporting documentation made available to us.

TÜV SÜD confirms that the project is implemented as described in the validated and registered project design documents. Based on the information we have assessed, we confirm that the GHG emission reductions are calculated without material misstatements in a conservative and appropriate manner.

Pune, 23/05/2016



Eswar Murty

Certification Body “Environment and Energy”
TÜV SÜD South Asia

Appendix 1. Abbreviations

Abbreviations	Full texts
ACM	Approved Consolidated Methodology
CAR	Corrective Action Request
CB	Certification Body
CDM	Clean Development Mechanism
CCP	Carbon Climate Protection GmbH
CDM-EB	CDM Executive Board
CER	Certified Emission Reduction
CMP	Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol
CO ₂ e	Carbon dioxide equivalent
CR / CL	Clarification Request
DNA	Designated National Authority
DOE	Designated Operational Entity
EF	Emission Factor
ER	Emission Reduction
FAR	Forward Action Request
GHG	Greenhouse Gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
IRL	Information Reference List
KP	Kyoto Protocol
MP	Monitoring Plan
MR	Monitoring Report
MTPD	Metric Tons per Day
NDIR	Non Dispersive Infra Red
PCP	Project Cycle Procedure
PDD	Project Design Document
PP	Project Participant
PS	Project Standard
TÜV SÜD	TÜV SÜD South Asia Pvt. Ltd
UNFCCC	United Nations Framework Convention on Climate Change
VVS	Clean Development Mechanism Validation And Verification Standard

Appendix 2. Competence of team members and technical reviewers



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	ISO-14064-1: 2006	Other
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Qualification as						
Status	Validator	Verifier	ATL	Technical Reviewer	Financial Expert	Technical Expert
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
TA (s)	1.2, 5.1, 5.2, 11.1, 11.2, 12.1					

Country Expertise						
Region	1	2	3	4	5	Other
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Further countries						

Technical Area
1.2_Renewables
5.1_Chemical industry
5.2_Caprolactam, nitric and adipic acid
11.1_Emissions of fluorinated gases
11.2_Refrigerant gas production
12.1_Chemical industry

This appointment is valid until 28.02.2017 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-0017/006.

Dato	Signature
01/02/2016	

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South Asia

CERTIFICATE OF APPOINTMENT

Mr. Castro, Javier 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	ISO-14064-1: 2006	Other
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Qualification as						
Status	Validator	Verifier	ATL	Technical Reviewer	Financial Expert	Technical Expert
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
TA (s)	1.2, 5.1, 11.2, 12.1, 13.2					

Country Expertise						
Region	1	2	3	4	5	Other
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Further countries						

Technical Area	
1.2_Renewables	
5.1_12.1_Chemical industry	
11.2_Refrigerant gas production	
13.2_Manure	

This appointment is valid until 28.02.2017 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-0009/006.

Date	Signature
01/02/2016	

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ZERTIFIKAT ♦ CERTIFICATE ♦ 認証証書 ♦ CERTIFICADO ♦ CERTIFICAT



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.

Standard	Qualification applicable to				
	CDM	GS	VCS	ISO-14064-1: 2006	Other
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Status	Qualification as					
	Validator	Verifier	ATL	Technical Reviewer	Financial Expert	Technical Expert
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
TA (s)	1.1, 5.1, 11.1, 12.1					

Region	Country Expertise					
	1	2	3	4	5	Other
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Further countries						

Technical Area
1.1_Thermal energy generation
5.1_12.1_Chemical industry
11.1_Emission of fluorinated gases

This appointment is valid until 28.02.2017 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-0054/006.

Date	Signature
01/02/2016	

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Appendix 3. Documents reviewed or referenced

No.	Author	Title	References to the document	Provider
Monitoring Report, Project Design Documents, Previous Verification Reports				
1a	ENAEX S.A.	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.	CDM Registration N° 5393	UNFCCC webpage
1b	TÜV NORD	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	CDM Registration N° 5393	UNFCCC webpage
1c	ENAEX S.A.	Revised 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 1.4, dated on September 17th, 2014	CDM Registration N° 5393	UNFCCC webpage
1d	TÜV SÜD	Validation Opinion of post registration change at an existing CDM-project: Catalytic N2O destruction project at the new nitric acid plant PANNA 4 of Enaex S.A. (UNFCCC registration ref. No. 5393) report No. 00875HA issued by TÜV SÜV dated on 22/09/2014	CDM Registration N° 5393	UNFCCC webpage
1e	TÜV SÜD	Previous Verification Reports, specially the last one	Previous FARs	UNFCCC webpage
1f	ENAEX S.A.	Previous Monitoring Reports	Previous FARs	UNFCCC webpage
1g	ENAEX S.A.	Monitoring Report version 1 dated on 09/03/2016 (published version)	MR Publication	Project Participants
1h	ENAEX S.A.	Monitoring Report version 2 dated on 27/04/2016	Final MR	Project Participants
References and requirements at UNFCCC				
2a	UNFCCC	UNFCCC homepage http://www.unfccc.int including the CDM section http://cdm.unfccc.int/index.html .	CDM Requirements	UNFCCC webpage
2b	UNFCCC	Approved consolidated baseline and monitoring methodology ACM0019 - N2O abatement from nitric acid production, version 02.0	CDM Requirements	UNFCCC webpage
2c	UNFCCC	Tool to determine the mass flow of a greenhouse gas in a gaseous stream, version 03.0 Annex 10, EB87	CDM Requirements	UNFCCC webpage
Project Implementation, Licenses				
4a	ENAEX S.A. Técnicas Reunidas S.A.	Test run Protocol for Panna4 Nitric Acid Plant signed by ENAEX and Técnicas Reunidas Espindesa 05/11/2011	Project Implementation	Project Participants
4b	Técnicas Reunidas S.A.	Process Data Sheet of R4501 Ammonia Oxidation Reactor of Panna4 Nitric Acid Plant issued by Técnicas Reunidas, 01 Process Data and 02 Materials rev. 01 dated on 22/09/2006	Project Implementation	Project Participants
4c	CONAMA	Resolución Exenta N° 0121/2006 – permit for the whole complex dated on 29/05/2006 issued by CONAMA	Project Implementation	Project Participants
4d	ENAEX S.A.	Data Sheet of AOR Thermocouple TT-45030 A,B,C	Project Implementation	Project Participants
4e	Heraeus	Secondary Catalyst installation report issued by Heraeus dated on 30/11/2011	Project Implementation	Project Participants
4f	ENAEX S.A.	Screenshots of the control panel from FoxView (AOR temperature range)	Project Implementation	Project Participants
4g	ENAEX S.A.	Commissioning Certificates for TAG's Meters: AT45094 A, AT45094 B, AT45094 C, FT45092, PT45091, PT45095, PT45097, TT45093, TT45096, dated on 13/12/2011	Project Implementation	Project Participants
4h	ENAEX S.A.	Print screen of DeltaV screen dated 06/04/2016	Project Implementation	Project Participants
4i	Técnicas Reunidas S.A.	Memorandum – Actual Capacity of Panna IV Nitric Acid Plant" issued by Técnicas Reunidas, S.A. and signed by the Fertilizer Division Manager dated on 01/03/2013	Project Implementation	Project Participants
4j	Técnicas Reunidas S.A.	Operating Manual – Project Panna 4 "Manual de operacion ProyectoPanna 4" issued by Técnicas Reunidas (UTE TR-ESPINDESA) dated on May 2008	Project Implementation	Project Participants
4k	Heraeus	Secondary Catalyst System Inspection and Installation Report, performed by Heraeus on 23/07/2012	Project Implementation	Project Participants
Procedures and standards				
5a	DIN	European Standard EN14181 Stationary source emissions - Quality assurance of automated measuring systems dated on February 2015	EN14181	TÜV SÜD
5b	ENAEX S.A.	"Responsibilities & Operational Project Structure.pdf" version 1.0 issued by ENAEX dated on February 2012	Project Operation	Project Participants
5c	Bureau Veritas	ISO 9001 Certificate for Planta Prillex America Mejillones Enaex S.A. valid until 29/10/2015	Project Operation	Project Participants
Monitoring Equipment				
6a	See the right	Email from Elliot Sanchez Product Manager Flow & EMS Endress +Hauser	Monitoring	Project

CDM-VCR-FORM

	column	Chile Ltda regarding recommendations of calibration frequency	Instrument	Participants
6b	See the right column	Manufacturer's declaration, Document number 5006501 regarding Model TC10 issued by WIKA Alexander Wiegand SE & Co. KG	Monitoring Instrument	Project Participants
6c	See the right column	Statement from INOR – signed by a Service and Calibration Engineer - regarding stability of Meso-H / Meso HX applications	Monitoring Instrument	Project Participants
6d	See the right column	Email from Anibal Gonzales from INECO S.A. regarding recommendations of calibration frequency of PT-45091, TT-45093 and PT-45095	Monitoring Instrument	Project Participants
6e	See the right column	Delta V Print Screen – Version number 11.3	Monitoring Instrument	Project Participants
6f	See the right column	Statement from INECO dated on May 2012 regarding the hourly average calculation in the Delta-V system	Monitoring Instrument	Project Participants
6g	See the right column	Statement from INECO dated on May 2012 regarding recommended calibration frequency of pressure model 2051C and temperature model 3144P transmitters	Monitoring Instrument	Project Participants
6h	See the right column	Rosemount 2051 Reference Manual 00809-0100-4101, Rev AA dated on July 2008	Monitoring Instrument	Project Participants
6i	See the right column	Rosemount 2051 Reference Manual 00809-0200-4101, Rev AA dated on July 2008	Monitoring Instrument	Project Participants
6j	See the right column	Rosemount 3144P Reference Manual dated on August 2014	Monitoring Instrument	Project Participants
EN-14181 Test certificates / Evidences				
7a	See the right column	FT 45026 and AT45026 Coriolis Flow and density calibration certificate issued by Endress+Hauser Flowtec dated on 09/11/2011 and density calibration certificate issued by BY H&D Fitzgerald Ltd dated of issue 07/10/2013 FT 45026 and AT45026 Coriolis Flow and density calibration certificate issued by Endress+Hauser Flowtec dated on 13/11/2014 and density calibration certificate issued by Endress+Hauser Flowtec dated of issue 14/11/2014	Calibration	Project Participants
7b	See the right column	AT-45094 and FT-45092: QAL2 report issued by AIRTEC Date of test 23.10-25.10.2013. 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)	QAL 2 Calibration	Project Participants
7c	See the right column	TT 45093: Serial number 706088 Temperature Transmitter Calibration Certificate issued by ENAEX S.A. dated on 22/08/2012 TT 45093: Serial number 706088 Temperature Transmitter Calibration Certificate issued by ENAEX S.A. dated on 19/02/2015	Calibration	Project Participants
7d	See the right column	TT-45030 Thermometers: A: for serial number 1104NO00: Calibration protocol TE –45030 A issued by ENAEX dated on 12/08/2014 for serial number 1104NC51: Calibration protocol TE –45030 A issued by ENAEX dated on 19/11/2015 B: for serial number 1104NC5E: Calibration protocol TE –45030 B issued by ENAEX dated on 12/08/2014 for serial number 1107GTB8: Calibration protocol TE –45030 B issued by ENAEX dated on 19/11/2015 C: for serial number 1104NC5D: Calibration protocol TE –45030 C issued by ENAEX dated on 12/08/2014 for serial number 1107GTB6: Calibration protocol TE –45030 C issued by ENAEX dated on 19/11/2015	Calibration	Project Participants
7e	See the right column	TT-45050 - Certificate issued by ENAEX for HNO3 Temperature Transmitter (Manufacturer: Inor; Model: Meso-H) Serial Number N0809.842183/VO336261 dated on 10/05/2014	Calibration	Project Participants
7f	See the right column	PT-45091 , Calibration Protocol, issued by ENAEX S.A., dated on 16/12/2014 Calibration Protocol, issued by ENAEX S.A., dated on 10/02/2015 Calibration Protocol, issued by ENAEX S.A., dated on 14/03/2015 Calibration Protocol, issued by ENAEX S.A., dated on 14/04/2015 Calibration Protocol, issued by ENAEX S.A., dated on 10/05/2015 Calibration Protocol, issued by ENAEX S.A., dated on 15/06/2015 Calibration Protocol, issued by ENAEX S.A., dated on 16/07/2015 Calibration Protocol, issued by ENAEX S.A., dated on 11/08/2015 Calibration Protocol, issued by ENAEX S.A., dated on 11/09/2015 Calibration Protocol, issued by ENAEX S.A., dated on 08/10/2015 Calibration Protocol, issued by ENAEX S.A., dated on 08/11/2015 Calibration Protocol, issued by ENAEX S.A., dated on 19/12/2015	Calibration	Project Participants
7g	See the right column	PT-45095 Calibration Protocol, issued by ENAEX S.A., dated on 16/12/2014 Calibration Protocol, issued by ENAEX S.A., dated on 10/02/2015 Calibration Protocol, issued by ENAEX S.A., dated on 14/03/2015 Calibration Protocol, issued by ENAEX S.A., dated on 14/04/2015 Calibration Protocol, issued by ENAEX S.A., dated on 10/05/2015	Calibration	Project Participants

		Calibration Protocol, issued by ENAEX S.A., dated on 15/06/2015 Calibration Protocol, issued by ENAEX S.A., dated on 16/07/2015 Calibration Protocol, issued by ENAEX S.A., dated on 11/08/2015 Calibration Protocol, issued by ENAEX S.A., dated on 11/09/2015 Calibration Protocol, issued by ENAEX S.A., dated on 08/10/2015 Calibration Protocol, issued by ENAEX S.A., dated on 08/11/2015 Calibration Protocol, issued by ENAEX S.A., dated on 19/12/2015		
Other Regular Maintenance other than Calibration				
8a	ENAEX S.A.	Shewhart Control Chart, excel file with graphs of span and zero calibration values of N2O analyser for this monitoring period	EN14181 QAL 3	Project Participants
8b	See the right column	AT45094: QAL1 certificate MLT1 MLT2 of NGA Series issued by TÜV Rheinland Group dated on 16/02/1999	EN14181	Project Participants
8c	See the right column	AST Report (14-231_ENAEX AST report 2014_Panna 4_16-03-2015_Rev0), date of test 12 – 13/11/2014 issued by Airtec. AST Report (15-270_ENAEX AST report 2015-main part_Panna 4_Rev0), date of test 16 – 18/12/2015 issued by Airtec.	EN14181	Project Participants
8d	See the right column	Analyzer test gas certificates (zero gas, span gas used in this monitoring period) issued by Praxair S.A.	EN14181 QAL 3	Project Participants
Data Measured and Recorded				
9a	ENAEX S.A.	Delta V csv and mdi files (daily and monthly) for the monitoring period.	Data measured	Project Participants
9b	ENAEX S.A.	HNO ₃ raw data hourly data for this monitoring period exported from DCS to Excel file	Data measured	Project Participants
9c	ENAEX S.A.	Production Data “Listado de Producciones Diarias Planta Prillex América”	Production Logs	Project Participants
Calculation Spreadsheet and Tool				
10a	ENAEX S.A.	Spreadsheet of Calculation of Emission Reductions “MP 7_PANNA 4 (5393)_UNFCCC SUMMARY_v1_Confidential.xlsx” version 1 dated on 07/03/2016	CER Calculation	Project Participants
10b	ENAEX S.A.	Spreadsheet of Calculation of Emission Reductions “MP 7_PANNA 4 (5393)_UNFCCC SUMMARY_v2_Confidential.xlsx” version 2 dated on 27/04/2016	CER Calculation	Project Participants
Special Events				
11a	ENAEX S.A.	Process History View - Charts for hours of analyzer switch - taken during onsite audit	Data	Project Participants
11b	ENAEX S.A. AIRTEC	Email correspondence between ENAEX and AIRTEC explaining the delay in AST service (dated between August and November 2014) “AW_ AST in Panna 3_Panna4 (Evidence Airtec tests delay).pdf	AST	Project Participants
11c	ENAEX S.A.	MoC “PA5393 F-CDM-MOC form.pdf”	MoC	Project Participants
11d	ENAEX S.A.	TT45030 ABC February trend.pdf	CAR 03	Project Participants
11e	ENAEX S.A.	PT45091 june trend_1.pdf	CAR 04	Project Participants
11f	ENAEX S.A.	PT45091 june trend_2.pdf	CAR 04	Project Participants
Trainings				
12a	ENAEX S.A.	Signed List of Participants for Gas Analyzer Training (12/01/2012) held by Daniel Rojas Gas Analyser Specialist from INECO S.A.	Training	Project Participants
12b	ENAEX S.A.	Signed List of Participants for Delta V Training (12-13/01/2012) held by Pablo Saez Delta V Specialist from INECO S.A.	Training	Project Participants
12c	Carbon Climate Protection	Information on internal WebEx Trainings held by Carbon Climate Protection	Training	Project Participants

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

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

FAR ID	N/A	Section no.	N/A	Date: N/A
Description of FAR				
N/A				
Project participant response				Date: N/A
N/A				
Documentation provided by project participant				
N/A				
DOE assessment				Date: N/A
N/A				

Table 2. CL from this verification

CL ID	1	Section no.	E.1	Date: 06/05/2016
Description of CL				
<i>Some information presented in the Annex 1 of the MR is different than the information available in the PDD. It shall be clarified if this information has been submitted to the UNFCCC via new MoCs.y</i>				
Project participant response				Date: 06/05/2016
<i>The information presented in Annex 1 is now according to the information available in PDD and latest MoC.</i>				
Documentation provided by project participant				
<i>PA5393 F-CDM-MOC form</i>				
DOE assessment				Date: 08/05/2016
The assessment team has reviewed the MOC (IRL 11c) and the revised MR (IRL 1h). The responsible persons of the PPs are consistent. The finding is closed.				

Table 3. CAR from this verification

CAR ID	1	Section no.	E.1	Date: 06/05/2016
Description of CAR				
<i>Some information in the MR is not complete and transparent:</i>				
<ul style="list-style-type: none"> <i>The version mentioned for the tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" is not the latest version.</i> <i>Page 7 shall include information regarding the upgrade of the DCS system in November</i> <i>Table 3 shall be corrected to include clear dates and hours of the events.</i> 				
Project participant response				Date: 06/05/2016
<ul style="list-style-type: none"> <i>The version mentioned in MR for the tool is the latest version now.</i> <i>Page 7 includes information and explanation regarding the upgrade of DCS system, which was performed in November 2015.</i> <i>Table 3 was corrected and shows now clear dates and hours of all events.</i> 				
Documentation provided by project participant				
<i>MP 7_PANNA 4 (5393)_Monitoring Report_v2</i>				
DOE assessment				Date: 08/05/2016
The assessment team has reviewed the revised MR (IRL 1h). <ul style="list-style-type: none"> The correct version has been mentioned throughout the report. The information regarding the upgrade of DCS system in November has been included. The typo in table 3 has been corrected. The table shows now clear dates and hours of the events. This Finding is closed.				

CAR ID	2	Section no.	E.7	Date: 06/05/2016
Description of CAR				
<p>Some information regarding calibration is not correct:</p> <ul style="list-style-type: none"> The FT – 45026 has been changed during the monitoring period the information of the new equipment installed is to be included into the MR. The calibration dates of PT – 45091 and PT – 45095 as presented in the MR shall be the same as the information in the certificates Correction of the value of FT – 45026 due to the delay in the calibration shall be done on a conservative way 				
Project participant response				Date: 06/05/2016
<ul style="list-style-type: none"> The information about the installation of the new FT – 45026 was updated and included in the Monitoring Report. The calibration dates of PT – 45091 and PT – 45095 were checked against the corresponding certificates and correct dates were filled in. The recalculation of the value of FT – 45026 is now according to conservative criteria. 				
Documentation provided by project participant				
MP 7_PANNA 4 (5393)_UNFCCC SUMMARY_v2_Confidential				
DOE assessment				Date: 08/05/2016
<p>The assessment team has reviewed the revised MR (IRL 1h).</p> <ul style="list-style-type: none"> The information about the instrument change of FT-45026 has been included in the MR. The information is consistent with the information in the calibration certificate (IRL 7a) The dates of calibration of PT – 45091 and PT – 45095 were found to be consistent in the MR (IRL 1h), Excel Calculation (IRL 10b) and calibration certificates (IRL 7f and IRL 7g). The correction of the value of FT – 45026 due to the delay in calibration has been found on the conservative bias in the revised documents (IRL 1h and IRL 10b). <p>This Finding is closed.</p>				

CAR ID	3	Section no.	E.8.1	Date: 06/05/2016
Description of CAR				
<p>Some information presented in the excel file and in the MR is not consistent with the verified raw data:</p> <ul style="list-style-type: none"> The parameter h_y is based on the TT- 45030A, during the period from 09.02.2015 08:00 until 11.02.2015 00:00 the values are different to the other 2 temperature meters. Because of this too low value indicated by TT-45030A this period is considered as to be non operational in the Excel Calculation Tool, this is not correct as the plant was in operation. The parameter h_y shall be manually changed to present the correct operation of the plant. 				
Project participant response				Date: 06/05/2016
<p>During the period from 09.02.2015 08:00 until 11.02.2015 00:00 the plant had a problem with the functioning of TT – 45030A, but the backup instruments (TT – 45030B and TT – 45030C) were in normal operation. Therefore, for the affected hours the formulae of parameter h_y was changed manually and the backup instrument TT – 45030B now determines h_y as mentioned in the registered PDD.</p>				
Documentation provided by project participant				
<ul style="list-style-type: none"> MP 7_PANNA 4 (5393)_UNFCCC SUMMARY_v2_Confidential TT45030 ABC February trend 				
DOE assessment				Date: 08/05/2016
<p>The assessment team has reviewed the revised MR (IRL 1h) and the revised Excel Calculation Tool (IRL 10b) and the supporting document (IRL 11d). During the aforementioned period the information has been manually changed in the Excel Calculation Tool in order to reflect the normal operation of the plant.</p> <p>This Finding is closed.</p>				

CAR ID	4	Section no.	E.8.2	Date: 06/05/2016
Description of CAR				
<i>Data integrity and plausibility:</i>				
<ul style="list-style-type: none"> The PT – 45091 which measures the static pressure, indicates no plausible data between 15.06.2015 11:00 and 06.08.2015 12:00. 				
Project participant response				Date: 06/05/2016
<i>The recalculation of the values of PT – 45091 in the affected hours is now according to conservative criteria.</i>				
Documentation provided by project participant				
<ul style="list-style-type: none"> MP 7_PANNA 4 (5393)_UNFCCC SUMMARY_v2_Confidential PT45091 june trend_1 PT45091 june trend_2 				
DOE assessment				Date: 08/05/2016
<p>The assessment team has reviewed the revised MR (IRL 1h), the revised Excel Calculation Tool (IRL 10b) and the supporting documents (IRL 11e and IRL 11f). During the aforementioned period the value of static pressure has been conservatively treated as the maximum value observed during the monitoring period has been applied. Values observed during five operating hours before and after a plant start-up and shut-down were not used for the determination of this maximum values.</p> <p>This Finding is closed.</p>				

Table 4. FAR from this verification

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