VERIFICATION REPORT

- 2ND PERIODIC –

AQUARIUS ENERGÉTICA S.A.

AQUARIUS HYDROELECTRIC PROJECT

UNFCCC REF. NO. : 0627

Monitoring Period: 2008-01-01 to 2009-12-31
(incl. both days)

Report No: 8000382781 – 10/35 V01

Date: 2010-09-24

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Verification Report:	***Report No.***	***Rev. No.***	***Date of 1st issue:***	***Date of this rev.***
	8000382781 – 10/35 V01	-	2010-09-24	2010-09-24
Project:	***Title:***		***Registration date:***	***UNFCCC-No.:***
	Aquarius Hydroelectric Project		2006/12/15	0627
Project Participant(s):	***Host party:***		***Other involved parties:***	
	Brazil		Japan, UK and Ireland, Swizerland	
Applied methodology/ies:	***Title:***		***No.:***	***Scope:***
	Grid connected renewable electricity generation		AMS-I.D ver. 8	1
Monitoring:	***Monitoring period (MP):***		***No. of days:***	***MP No.***
	2008-01-01 to 2009-12-31 - both days included		731	2
Monitoring report:	***Title:***		***Draft version:***	***Final version:***
	Aquarius Hydroelectric Project		2010/02/10	2010/07/14
Verification team / Technical Review and Final Approval	***Verification Team:***		***Technical review:***	***Final approval:***
	Rainer Winter Gilberto Andrade Ricardo Lopes Fernanda Bortolotto (trainee)		Alexandra Nebel Ingo Klein	Martin Saalmann
Emission reductions: [t CO_{2e}]	***Verified amount***		***As per draft MR:***	***As per PDD:***
	35,466 t		35,500 t	13,436 t /year

Summary of Verification Opinion:

Aquarius Energética S.A. has commissioned the TÜV NORD JI/CDM Certification Program to carry out the 2nd periodic verification of the project: "Aquarius Hydroelectric Project", with regard to the relevant requirements for CDM project activities. The project reduces GHG emissions due to renewable power regeneration by a run-of river hydro power plant, providing and selling the energy to the regional grid. The installed capacity of the project is 4.2 MW. This verification covers the period from 2008-01-01 to 2009-12-31 (including both days).

In the course of the verification 7 Corrective Action Requests (CAR) and 1 Clarification Requests (CL) were raised and successfully closed. The verification is based on the draft monitoring report, revised monitoring report, the monitoring plan as set out in the registered PDD, the validation report, emission reduction calculation spreadsheet and supporting documents made available to the TÜV NORD JI/CDM CP by the project participant.

As a result of this verification, the verifier confirms that:

- all operations of the project are implemented and installed as planned and described in the validated project design document.
- the monitoring plan is in accordance with the applied approved CDM methodology ,ie, AMS I.D ver. 8
- the installed equipment essential for measuring parameters required for calculating emission reductions are calibrated appropriately.
- the monitoring system is in place and functional. The project has generated GHG emission reductions.

As the result of the 2nd periodic verification, the verifier confirms that the GHG emission reductions are calculated without material misstatements in a conservative and appropriate manner. TÜV NORD JI/CDM CP herewith confirms that the project has achieved emission reductions in the above mentioned reporting period as follows:

Emission reductions: **35,466** t CO_{2e}

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Abbreviations:

ANEEL	National Electricity Energy Agency
CA	Corrective Action / Clarification Action
CAR	Corrective Action Request
CCEE	Brazilian Commercialization Chamber of Electric Energy
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CO_2	Carbon dioxide
CO_{2eq}	Carbon dioxide equivalent
CL	Clarification Request
ELETROBRÁS	Brazilian Energy Company – *"Centrais Elétricas Brasileiras S.A."*
ENERSUL	Mato Grosso do Sul Energy Company – *"Energética de Mato Grosso do Sul Ltda."*
ER	Emission Reduction
FAR	Forward Action Request
GHG	Greenhouse gas(es)
IBAMA	Brazilian Institute of Environment and Renewable Natural Resources – *Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis*
MP	Monitoring Plan
MR	Monitoring Report
ONS	National operator of the electrical system
PDD	Project Design Document
PP	Project Participant
QA/QC	Quality Assurance / Quality Control

SHP	Small Hydroelectric Power Plant
UNFCCC	United Nations Framework Convention on Climate Change
XLS	Emission Reduction Calculation Spread Sheet

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1. INTRODUCTION

Aquarius Energética S.A. has commissioned the TÜV NORD JI/CDM Certification Program (CP) to carry out the 2nd periodic verification of the project

"Aquarius Hydroelectric Project"

with regard to the relevant requirements for CDM project activities. The verifiers have reviewed the implementation of the monitoring plan (MP) in the registered CDM project number 0627[1].

GHG data for the monitoring period covering 2008-01-01 to 2009-12-31 was verified in detailed manner applying the set of requirements, audit practices and principles as required under the Validation and Verification Manual /VVM/ of the UNFCCC.

This report summarizes the findings and conclusions of this 2nd periodic verification of the above mentioned UNFCCC registered project activity.

1.1. Objective

The objective of the verification is the review and ex-post determination by an independent entity of the GHG emission reductions. It includes the verification of the:

- implementation and operation of the project activity as given in the PDD,
- compliance with applied approved methodology and the provisions of the monitoring plan,
- data given in the monitoring report by checking the monitoring records, the emissions reduction calculation and supporting evidence,
- accuracy of the monitoring equipment,
- quality of evidence,
- significance of reporting risks and risks of material misstatements.

1.2. Scope

The verification of this registered project is based on the validated project design document /PDD/, the monitoring report /MR/, emission reduction calculation spread sheet /XLS/, supporting documents made available to the verifier and information collected through performing interviews and during the on-site assessment. Furthermore publicly available information was considered as far as available and required.

The verification is carried out on the basis of the following requirements, applicable for this project activity:

[1] http://cdm.unfccc.int/Projects/DB/DNV-CUK1158855257.5/view

- Article 12 of the Kyoto Protocol /KP/,
- guidelines for the implementation of Article 12 of the Kyoto Protocol as presented in the Marrakech Accords under decision 3/CMP.1 /MA/ and subsequent decisions made by the Executive Board and COP/MOP,
- other relevant rules, including the host country legislation,
- CDM Validation and Verification Manual /VVM/,
- monitoring plan as given in the registered PDD /PDD/,
- Approved CDM Methodology AMS-I.D ver.8: Grid connected renewable electricity generation.

2. GHG PROJECT DESCRIPTION

2.1. Project Characteristics

Essential data of the project is presented in the following Table 2-1.

Table 2-1: Project Characteristics

Item	Data		
Project title	Aquarius Hydroelectric Project		
Project size	☐ Large Scale ☒ Small Scale		
Project Scope *(according to UNFCCC sectoral scope numbers for CDM)*	☒	1	Energy Industries (renewable- /non-renewable sources)
	☐	2	Energy distribution
	☐	3	Energy demand
	☐	4	Manufacturing industries
	☐	5	Chemical industry
	☐	6	Construction
	☐	7	Transport
	☐	8	Mining/Mineral production
	☐	9	Metal production
	☐	10	Fugitive emissions from fuels (solid, oil and gas)
	☐	11	Fugitive emissions from production and consumption of halocarbons and hexafluoride
	☐	12	Solvents use
	☐	13	Waste handling and disposal
	☐	14	Afforestation and Reforestation
	☐	15	Agriculture
Applied Methodology	AMS-I.D ver.8: Grid connected renewable electricity generation.		
Technical Area(s)	S: Renewable - Hydro		
CDM registration No.	0627		
Crediting period	☒ Renewable Crediting Period (7 y) ☐ Fixed Crediting Period (10 y)		

2.2. Project Verification History

Essential events since the registration of the project are presented in the following Table 2-2.

Table 2-2: Project verification history

#	Item	Time	Status
1	Date of registration	2006-12-15	-
2	Start of crediting period	2006-12-15	-
3	1st Monitoring period	2006-12-15 to 2007-12-31	Issued
4	Request for review	2008-12-19	Approved
5	2nd Monitoring period	2008-01-01 to 2009-12-31	Awaiting issuance request

2.3. Involved Parties and Project Participants

The following parties to the Kyoto Protocol and project participants are involved in this project activity (Table 2-3).

Table 2-3: Project Parties and project participants

Characteristic	Party	Project Participant
Host party	Brazil	Aquarius Energética S.A.
Other involved party/ies	UK and Ireland	MGM Carbon Portfolio S.a.r.l.
Other involved party/ies	Swizerland	MGM Carbon Portfolio S.a.r.l.
Other involved party/ies	Japan	Electric Power Development Co., Ltd.

2.4. Project Location

The details of the project location are given in table 2-4:

Table 2-4: Project Location

No.	Project Location
Host Country	Brazil
Region:	Mato Grosso do Sul State
Project location address:	Sonora Municipality Correntes River
Latitude:	17º37'18''S
Longitude:	54º55'24''W

2.5. Technical Project Description

The project is a small run-of-river hydroelectric project located on the Correntes river, near the town of Sonora (Mato Grosso do Sul State), Brazil, and is operated by Aquarius Energética S.A. The generated electricity is supplied to the national grid through Enersul.

Enersul (Electricity Company of Mato Grosso do Sul SA) was founded in 1979, being responsible for supplying energy to the state, which is responsible to supply energy from the Sonora substation to the South-Southwest-Midwest (S-SE-CO) regional grid of Brazil.

CCEE (Electrical Energy Comercialization Chamber) is responsible for making possible the sale of electricity in the National Interconnected System in Environments of Regulated Contracts and Contract Free, besides making the accounting and financial settlement of transactions in the market in the short term. The Rules and Procedures governing the marketing activities performed in the CCEE are approved by ANEEL.

And ANEEL(National Electric Energy Agency) is a regulatory agency, under the Ministry of Mines and Energy, responsible to regulate and supervise the production, transmission and sale of electricity in accordance with the policies and guidelines of the Federal Government.

Emission reductions are determined multiplying the amount of net electricity exported to the grid by the ex-ante fixed emission coefficient of 0.5217 tCO2/MWh. There are no project emissions and leakage associated with the project. The expected life time of the project is 30 years.

The key parameters for the project are given in table 2-5:

Table 2-5: Technical data of the plant

Parameter	Unit	Value
Turbines		
Manufacturer		HISA
Quantity	1	2
Potency	MW	2.208
Nominal	rpm	600
Serial Number Turbine 1	-	UG1 1998
Serial Number Turbine 2	-	UG1 1994
Generators		
Manufacturer	-	WEG model SPD 710
Quantity	-	2
Potency	kVA	2350
Unit Nominal Power	MW	2.1
Nominal	rpm	600
Serial Number Generator 1	-	145473
Serial Number Generator 2	-	145474

3. METHODOLOGY AND VERIFICATION SEQUENCE

3.1. Verification Steps

The verification consisted of the following steps:

- Contract review
- Appointment of team members and technical reviewers
- Publication of the monitoring report
- A desk review of the Monitoring Report /MR/ submitted by the client and additional supporting documents with the use of customised verification protocol /CPM/ according to the Validation and Verification Manual /VVM/,
- Verification planning,
- On-Site assessment,
- Background investigation and follow-up interviews with personnel of the project developer and its contractors,
- Draft verification reporting
- Resolution of corrective actions (if any)
- Final verification reporting
- Technical review
- Final approval of the verification.

The sequence of the verification is given in the table 3.1 below:

Table 3.1: Verification sequence

Topic	Time
Assignment of verification	2009-11-30
Uploading of Monitoring Report	2010-03-08
On-site visit	2010-04-07
Draft reporting finalised	2010-04-07
Final reporting finalised	2010-07-19
Technical review finalised	2010-09-24

3.2. Contract review

To assure that

- the project falls within the scopes for which accreditation is held,
- the necessary competences to carry out the verification can be provided,
- Impartiality issues are clear and in line with the CDM accreditation requirements

a contract review was carried out before the contract was signed.

3.3. Appointment of team members and technical reviewers

On the basis of a competence analysis and individual availabilities a verification team, consistent of one team leader, 2 additional team member and 1 trainee, was appointed. Furthermore also the personnel for the technical review and the final approval was determined.

The list of involved personnel, the tasks assigned and the qualification status are summarized in the table 3-1 below.

Table 3-1: Involved Personnel

	Name	Company	Function [1]	Qualification Status [2]	Scheme competence	Technical competence [4]	Host country Competence	Team leading competence
☒ Mr. ☐ Ms.	Rainer Winter	TÜV NORD CERT, Germany	TL	SA	☒	S	☐	☒
☒ Mr. ☐ Ms.	Gilberto Andrade	BRTÜV (TÜV NORD Brazil), São Paulo	TM	E	☒	S	☒	☐
☒ Mr. ☐ Ms.	Ricardo Lopes	BRTÜV (TÜV NORD Brazil), São Paulo	TM	E	☒	-	☒	☐
☐ Mr. ☒ Ms.	Fernanda Bortolotto	BRTÜV (TÜV NORD Brazil), São Paulo	-	T	☐	-	☒	☐

	Name	Company	Function [1]	Qualification Status [2]	Scheme competence	Technical competence [4]	Host country Competence	Team leading competence
☐ Mr. ☒ Ms.	Alexandra Nebel	TÜV NORD CERT, Germany	TR[3]	A	☒	-	☐	☒
☒ Mr. ☐ Ms.	Ingo Klein	TÜV NORD CERT, Germany	TR[3]	E	☒	S	☐	☐
☒ Mr. ☐ Ms.	Martin Saalmann	TÜV NORD CERT, Germany	FA	SA	☒	-	☐	☒

[1] TL: Team Leader; TM: Team Member, TR: Technical review; FA: Final approval

[2] GHG Auditor Status: A: Assessor; E: Expert; SA: Senior Assessor; T: Trainee; TE: Technical Expert

[3] No team member

[4] As per S01-MU03 or S01-VA070 A2 (such as A, B, C.....)

3.4. Publication of the Monitoring Report

In accordance with the CDM M&P (§ 62) the draft monitoring report, as received from the project participants, has been made publicly available on the dedicated UNFCCC CDM website prior to the verification activity commenced.

3.5. Verification Planning

In order to ensure a complete, transparent and timely execution of the verification task the team leader has planned the complete sequence of events necessary to arrive at a substantiated final verification opinion.

Various tools have been established in order to ensure an effective verification planning.

Risk analysis and detailed audit testing planning

For the identification of potential reporting risks and the necessary detailed audit testing procedures for residual risk areas table A-1 is used. The structure and content of this table is given in table 3-2 below.

Table 3-2: Table A-1; Identification of verification risk areas

Table A-1: GHG calculation procedures and management control testing / Detailed audit testing of residual risk areas and random testing				
Identification of potential reporting risk	**Identification, assessment and testing of management controls**	**Areas of residual risks**	**Additional verification testing performed**	**Conclusions and Areas Requiring Improvement (including *Forward Action Requests*)**
The following potential risks were identified and divided and structured according to the possible areas of occurance.	*The potential risks of raw data generation have been identified in the course of the monitoring system implementation.* *The following measures were taken in order to minimize the corresponding risks.* *The following measures are implemented:*	*Despite the measures implemented in order to reduce the occurrence probability the following residual risks remain and have to be addressed in the course of every verification.*	*The additional verification testing performed is described. Testing may include:* - *Sample cross checking of manual transfers of data* - *Recalculation* - *Spreadsheet 'walk throughs' to check links and equations* - *Inspection of calibration and maintenance records for key equipment* - *Check sampling analysis results* *Discussions with process engineers who have detailed knowledge of process uncertainty/error bands.*	*Having investigated the residual risks, the conclusions should be noted here. Errors and uncertainties are highlighted.*

The completed table A-1 is enclosed in the annex 1 (table A-1) to this report.

Project specific periodic verification checklist

In order to ensure transparency and consideration of all relevant assessment criteria, a project specific verification protocol has been developed. The protocol shows, in a transparent manner, criteria and requirements, means and results of the verification. The verification protocol serves the following purposes:

- It organises, details and clarifies the requirements a CDM project is expected to meet for verification.
- It ensures a transparent verification process where the verifying DOE documents how a particular requirement has been proved and the result of the verification.

The basic structure of this project specific verification protocol for the periodic verification is described in table 3-3.

Table 3-3: Structure of the project specific periodic verification checklist

Table A-2: Periodic verification checklist				
Checklist Item	***Reference***	***Verification Team Comments***	***Draft Conclusion***	***Final Conclusion***
The checklist items in Table A-2 are linked to the various require-ments the monitoring of the project should meet. The checklist is organised in various sections as per the requirements of the topic and the individual project activity. It further includes guidance for the verification team.	*Gives reference to the information source on which the assessment is based on.*	*The section is used to elaborate and discuss the checklist item in detail. It includes the assessment of the verification team and how the assessment was carried out. The reporting requirements of the VVM shall be covered in this section.*	*Assessment based on evidence provided if the criterion is fulfilled (OK), or a CAR, CL or FAR (see below) is raised. The assessment refers to the draft verifi-cation stage.*	*In case of a corrective action or a clarification the final assessment at the final verification stage is given.*

The periodic verification checklist (verification protocol) is the backbone of the complete verification starting from the desk review until final assessment. Detailed assessments and findings are discussed within this checklist and not necessarily repeated in the main text of this report.

The completed verification protocol is enclosed in the annex (table A-2) to this report.

3.6. Desk review

During the desk review all documents initially provided by the client and publicly available documents relevant for the verification were reviewed. The main documents are listed below:

- the last revision of the PDD including the monitoring plan/PDD/,
- the last revision of the validation report/VAL/,
- the monitoring report, including the claimed emission reductions for the project/MR/,
- the emission reduction calculation spreadsheet/XLS/.

Other supporting documents, such as publicly available information on the UNFCCC website and background information were also reviewed.

3.7. On-site assessment

As most essential part of the verification exercise it is indispensable to carry out an inspection on site in order to verify that the project is implemented in accordance with

the applicable criteria. Furthermore the on-site assessment is necessary to check the monitoring data with respect to accuracy to ensure the calculation of emission reductions. The main tasks covered during the site visit include, but are not limited to:

- The on-site assessment included an investigation of whether all relevant equipment is installed and works as anticipated.
- The operating staff was interviewed and observed in order to check the risks of inappropriate operation and data collection procedures.
- Information processes for generating, aggregating and reporting the selected monitored parameters were reviewed.
- The duly calibration of all metering equipment was checked.
- The monitoring processes, routines and documentations were audited to check their proper application.
- The monitoring data were checked completely.
- The data aggregation trails were checked via spot sample down to the level of the meter recordings.

The complete verification team attended the site visit.

Before and during the on-site visit the verification team performed interviews with the project participants to confirm selected information and to resolve issues identified in the document review.

Representatives of Aquarius Energética S.A and MGM International (project consultant) including the operational staff of the plant were interviewed. The main topics of the interviews are summarised in Table 3-4.

Table 3-4: Interviewed persons and interview topics

Interviewed Persons / Entities	Interview topics
1. Projects & Operations Personnel, Aquarius Energética S.A. 2. Consultant, MGM International	- General aspects of the project - Technical equipment and operation - Changes since validation - Monitoring and measurement equipment - Remaining issues from validation - Calibration procedures - Quality management system - Involved personnel and responsibilities - Training and practice of the operational personnel - Implementation of the monitoring plan - Monitoring data management - Data uncertainty and residual risks - GHG emission reduction calculation - Procedural aspects of the verification - Maintenance - Environmental aspects

3.8. Draft verification reporting

On the basis of the desk review, the on-site visit, follow-up interviews and further background investigation the verification protocol is completed. This protocol together with a general project and procedural description of the verification and a detailed list of the verification findings form the draft verification report. This report is sent to the client for resolution of raised CARs, CLs and FARs.

3.9. Resolution of CARs, CLs and FARs

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

Corrective Action Requests (CARs) are issued, if:

- Non-conformities with the monitoring plan or methodology are found in monitoring and reporting, or if the evidence provided to prove conformity is insufficient;
- Mistakes have been made in applying assumptions, data or calculations of emission reductions which will impair the estimate of emission reductions;
- Issues identified in a FAR during validation or previous verifications requiring actions by the project participants to be verified during verification have not been resolved.

The verification team uses the term Clarification Request (CL), which is be issued if:

- information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

Forward Action Requests (FAR) indicate essential risks for further periodic verifications. Forward Action Requests are issued, if:

- the monitoring and reporting require attention and / or adjustment for the next verification period.

For a detailed list of all CARs, CLs and FARs raised in the course of the verification pl. refer to chapter 4.

3.10. Final reporting

Upon successful closure of all raised CARs and CLs the final verification report including a positive validation opinion can be issued. In case not all essential issues could finally be resolved, a final report including a negative validation opinion is issued.

The final report summarizes the final assessments w.r.t. all applicable criteria.

3.11. Technical review

Before submission of the final verification report a technical review of the whole verification procedure is carried out. The technical reviewer is a competent GHG auditor being appointed for the scope this project falls under. The technical reviewer is not considered to be part of the verification team and thus not involved in the decision making process up to the technical review.

As a result of the technical review process the verification opinion and the topic specific assessments as prepared by the verification team leader may be confirmed or revised. Furthermore reporting improvements might be achieved.

3.12. Final approval

After successful technical review an overall (esp. procedural) assessment of the complete verification will be carried out by a senior assessor located in the accredited premises of TÜV NORD.

After this step the request for issuance can be started.

4. VERIFICATION FINDINGS

In the following paragraphs the findings from the desk review of the monitoring report[/MR/], the calculation spreadsheet[/XLS/], PDD[/PDD/], the Validation Report[/VAL/] and other supporting documents, as well as from the on-site assessment and the interviews are summarised.

The summary of CAR, CL and FAR issued are shown in Table 4-1:

Table 4-1: Summary of CAR, CL and FAR

Verification topic	No. of CAR	No. of CL	No. of FAR
H - Project history	0	0	0
U - Update on Changes and Incidents	2	0	0
R - Monitoring Report – General	2	0	0
P - Monitoring Parameters	2	0	0
C - Emission Reduction Calculation	1	0	0
Q - Quality Management	0	1	0
SUM	**7**	**1**	**0**

The following tables include all raised CARs, CLs and FARs and the assessments of the same by the verification team. For an in depth evaluation of all verification items it should be referred to the verification protocols (see Annex).

Finding:	**CAR P1**		
Classification	☒ CAR	☐ CL	☐ FAR

Finding:	CAR P1
Description of finding *Describe the finding in unambiguous style; address the context (e.g. section)*	According to EB 52, annex 60, in cases neither the monitoring methodology neither the monitoring plan specify any requirement for calibration frequency, equipments shall be calibrated according specifications of the local/national standards or as per the manufacturer specification. It is stated in the registered validation report, in CAR 3 response, that equipments will be calibrated every 2 years. As observed in the calibrate certificates and as stated in the monitoring report, equipment are calibrated every 3 years. According to ONS (National operator of the electrical system), measurement equipment shall be calibrated every two years. Clarification and correction is required about the calibration frequency specified in the monitoring report.
Corrective Action #1 *This section shall be filled by the PP. It shall address the corrective action taken in details.*	The monitoring report and excel spreadsheet *MGM_Aquarius_Workbook.xls* were amended according to such request. In accordance with EB procedure, a percentage equivalent to the electricity meter's precision class was discounted from the electricity generated during the time spam of 265 days between the meter calibrations.
DOE Assessment #1 *The assessment shall encompass all open issues in annex A-2. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.*	The frequency of the calibration of the meters was corrected to 2 years, according requirements from ONS norm 12. As there is an interval of 265 days between the 2 last calibration, as observed in the reports/LTA/ , a precision factor of 2% was applied for the calculation of the emission reduction, properly following the requirements of the Guidelines for assessing compliance with the calibration frequency requirements/GCFR/ (EB 52, Annex 60, para 4). This value of 2% is stated in the spreadsheet/XLS2/ sent as evidence to the validation team. However, in spreadsheet provided in the CCEE website (http://www.ccee.org.br/StaticFile/Arquivo/biblioteca_virtual/Procedimentos_Vigentes/formulario_de_cadastro_do_sistema_de_medicao.xls), there is no precision factor of the meters from ITRON manufacturer (meters from Aquarius hydroelectric). So please, make clear the assumption taken to considerer the value of 2% as precision factor, and please justify the value in the monitoring report. Furthermore, correct values in Electricity generation spreadsheet, as values in Cell D17 and F12 do not match with its respective values before the discount. **CAR remains open.**

Finding:	CAR P1
Corrective Action #2	Electricity monitoring equipment is certified under IEC 60687 (International Electrotechnical Commission) norm wich establishes equipment accuracy requirements and maximum permited errors for 0.2S meters. Instrument technical specifications showing IEC norm compliance and maximum permissible error for Aquarius operating ranges and manufacturer email stating what is said here are attached. Electricity generation spreadsheet "MGM Aquarius workbook (updated according to findings) 30 Apr 2010.xls" was modified in order to show hidden cells that are used to calculate discount from July 17th to 31st, 2008 and from April 1st to 8th, 2009. D17 and F12 cells are full monthly values containing those days where the instrument was inside and outside of the calibration period.
DOE Assessment #2	According manufacturer specification of the meter/MAN9/ used in Aquarius, the value of error of reading is 0.2%, and it is also in accordance with mail from Engineer of Itron (manufacturer), that specifies the maxim error value of 0.2%, which complies with the Guidelines for assessing compliance with the calibration frequency requirements/GCFR/ (EB 52, Annex 60, para 4). Electricity generation spreadsheet/XLS/ was updated accordingly, showing hidden cells that are used in the calculation of the electricity generation. Furthermore, MR was update accordingly. **CAR is closed.**
Conclusion *Tick the appropriate checkbox*	☐ To be checked during the next periodic verification ☒ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements

Finding:	CAR P2		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding *Describe the finding in unambiguous style; address the context (e.g. section)*	Parameter "electricity generation" shall be consistent in the whole MR once it is ´EG´.		
Corrective Action #1 *This section shall be filled by the PP. It shall address the corrective action taken in details.*	The parameter "electricity generation" was corrected and is being named as EG in the hole report.		

Finding:	CAR P2
DOE Assessment #1 *The assessment shall encompass all open issues in annex A-2. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.*	MR was revised accordingly and name of parameter is now consistent throughout the document. **CL is closed.**
Conclusion *Tick the appropriate checkbox*	☐ To be checked during the next periodic verification ☐ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements

Finding:	CAR U1		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding *Describe the finding in unambiguous style; address the context (e.g. section)*	The following issues shall be corrected in the monitoring report: 1. please include a comparison of the actual ER claimed in the monitoring period with the estimate in the registered PDD and explanation in case of significant increase; 2. correct serial number of the principal monitoring equipment in table 2.		
Corrective Action #1 *This section shall be filled by the PP. It shall address the corrective action taken in details.*	1. The above-mentioned comparison and an explanation about the over performance of the hydropower plant during the monitored period were included in the Monitoring report. 2. The serial number of the principal monitoring equipment has been corrected.		
DOE Assessment #1 *The assessment shall encompass all open issues in annex A-2. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.*	1. A comparison and justification about the over performance of the ER claimed in the monitoring report with the estimate in the registered PDD were correctly included. Furthermore, audit team had checked during the on site visit that there was no change in the potency of the equipments operating in the small hydropower project. 2. Serial number of the principal monitoring equipment was correctly accordingly to 3273994 to 43273994. **CAR is closed.**		

Finding:	CAR U1
Conclusion *Tick the appropriate checkbox*	☐ To be checked during the next periodic verification ☒ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements

Finding:	CAR U2		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding *Describe the finding in unambiguous style; address the context (e.g. section)*	1. Section 10: Special Events and Over Performance: It shall be described whether the Environmental State Agency legislation for Ponte de Pedra project has been made public before or after the registration of the Aquarius project activity. *(This information seems necessary to show that at the time of registration this information was not known.)* In case it could have been know before the registration of the project an explanation shall be provided why it was not taken into account. 2. Section 10: Further in the Answer from PP on the RfReview it says “a minimum water flow of 10.5 m^3/s” and not 10 m^3/s as in the MR. The right value shall be identified. (In case the right value is 10 m^3/s it shall be explained in the MR why the answer of the RfR used a wrong value.)		

Finding:	CAR U2
Corrective Action #1 *This section shall be filled by the PP. It shall address the corrective action taken in details.*	1. Version number 1 of the PDD was finished and submitted to DNV for validation in April 2003 while the applied fine to Ponte de Pedra in order to assure water supply to the inhabitants and wild life of the area was made during 2004. Most of the project information stated on PDD, such as electricity to be generated by the project activity, was obtained from project construction design documents since Aquarius project construction started on May, 2005 and operations started on September, 2006. The registered version of the PDD (version 3) dated on August, 2006, was updated with more recent economic data and more recent data for the determination of the emissions factors, but electricity generation used in ER calculations remained based on initial engineering design. It was one month before the beginning of operations of Aquarius power plant and therefore no comparison with real electricity generation was possible. There is no explanation on why it was not taken into consideration at the time of registration request but, during the validation process the DOE in charge did not require the revision of the electricity generation estimations. At that time, PDD ERs were considered as "estimations" and would not be taken into consideration at the time of CERs issuance. 2. The right value is $10m^3/s$. This was the final value reported by DNV in the file "DNV Response to RfR" and it is consistent with stated link on the footnote. The PP's response has a wrong value because of a typo error.
DOE Assessment #1 *The assessment shall encompass all open issues in annex A-2. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.*	1. According to statement by PP above, although information was available at time of registration, it was not taken in account during validation nor requested by validating DOE. TÜV NORD concludes that the explanation helps to make the process transparent. No further clarification is required as the investment decision and additionality assessment was based on data from 2003 and 2004, which were not affected by the new Environmental State Agency legislation for Ponte de Pedra that came out in 2006. 2. Ok, it was clarify that the correct value is $10m^3/s$ and it was kept in the MR; **CL is closed**
Conclusion *Tick the appropriate checkbox*	☐ To be checked during the next periodic verification ☒ Appropriate action was taken ☐ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements

Finding:	**CAR R1**		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding *Describe the finding in unambiguous style; address the context (e.g. section)*	At the front page and in sections 1, 13 and 14, please include the statement "both days are included" after the described monitoring period.		
Corrective Action #1 *This section shall be filled by the PP. It shall address the corrective action taken in details.*	The statement "both days are included" was included in all corresponding sections of the Monitoring Report.		
DOE Assessment #1 *The assessment shall encompass all open issues in annex A-2. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.*	The statement "including both days" were correctly inserted in section 1, 13 and 14. **CAR is closed.**		
Conclusion *Tick the appropriate checkbox*	☐ To be checked during the next periodic verification ☒ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements		

Finding:	**CL R2**		
Classification	☐ CAR	☒ CL	☐ FAR
Description of finding *Describe the finding in unambiguous style; address the context (e.g. section)*	1. Section 4: Project location: Please indicate the coordinates of the project in the required UNFCCC format xx°xx'xx''S xx°xx'xx'' W. 2. Section 9: The exact location of the meters shall be described (e.g. power plant, substation). 3. Section 15: To the name of the client a dot shall be added to S.A as it is written on UNFCCC website.		
Corrective Action #1 *This section shall be filled by the PP. It shall address the corrective action taken in details.*	1. Correct coordinates have been inserted in the required UNFCCC format. 2. The meters location has been added in the meter table 3. A dot has been added as requested		
DOE Assessment #1 *The assessment shall encompass all open issues in annex A-2. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.*	1. Ok, section 4 was revised accordingly; 2. Ok, it was included in Table 2 in section 9 that the meters are located in the sub-station of ENERSUL; 3. Ok, Minor editorial correction carried out; **CL is closed**		

Finding:	CL R2
Conclusion *Tick the appropriate checkbox*	☐ To be checked during the next periodic verification ☐ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements

Finding:	CAR C1		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding *Describe the finding in unambiguous style; address the context (e.g. section)*	The following issues shall be corrected at ER Calculation: • Please, eliminate unnecessary values in the spreadsheet, keeping only the figures related to the monitoring period (from January 2008 to December 2009); • For conservative reasons, the CER values in Excel spreadsheet shall be rounded down and shall be used hundredth decimal point for Electricity Generation and Emission Reduction values. These figures are the ones to be copied to Table 4 and 5 (sections 13 and 14, respectively) of the Monitoring Report.		
Corrective Action #1 *This section shall be filled by the PP. It shall address the corrective action taken in details.*	• Excel spreadsheet has been amended regarding the unnecessary values. • A hundredth decimal point was used for the Electricity Generation values and CERs values were rounded down.		
DOE Assessment #1 *The assessment shall encompass all open issues in annex A-2. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.*	• Unnecessary values in the spreadsheet not regarding to the monitoring period (January 2008 to December 2009) were eliminate accordingly. • Values in CER calculation were rounded down and a hundredth decimal point was applied. Furthermore, tables 4 and 5 from the monitoring report were updated to 5 and 6. **CAR is closed.**		
Conclusion *Tick the appropriate checkbox*	☐ To be checked during the next periodic verification ☒ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements		

Finding:	CL Q1		
Classification	☐ CAR	☒ CL	☐ FAR

Finding:	CL Q1
Description of finding *Describe the finding in unambiguous style; address the context (e.g. section)*	Section 12: It shall be clarified in the QA/QC how the comparison between electricity generated and supplied is done? Please include a description.
Corrective Action #1 *This section shall be filled by the PP. It shall address the corrective action taken in details.*	Invoices of electricity sales are used. QA/QC description on Section 12 has been corrected for a better understanding
DOE Assessment #1 *The assessment shall encompass all open issues in annex A-2. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.*	OK, a more precise description was included in Section 12. **CL is closed**
Conclusion *Tick the appropriate checkbox*	☐ To be checked during the next periodic verification ☐ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements

5. SUMMARY OF VERIFICATION ASSESSMENTS

The following paragraphs include the summary of the final verification assessments after all CARs and CLs are closed out. For details of the assessments pl. refer to the discussion of the verification findings in chapter 4 and the verification protocol (Annex 1).

5.1. Implementation of the project

Discrepancies between the plant load factor as foreseen in the PDD and actual plant load factor were already addressed in the request for review for the monitoring period 2006/12/15 to 2007/12/31 (in the previous verification). Project participants and responsible DOE (which is DNV) provided additional information (Response to Request for Review issued by DNV on 2008/10/24). The issuance of credits for this period occurred on 2008/12/19. The monitoring report includes respective clarification and information on the actual installed capacity of the turbines and generators.

The verification team has reviewed invoices, technical information and nameplates of the installed equipment (turbines and generators. No discrepancies were detected from last verification period and the PDD. The verification team confirms that the installed capacity has not been changed since the project has started to generate energy and remains within the threshold for Small Scale type I project activities.

During the verification a site visit was carried out. On the basis of this site visit, the reviewed project documentation and the consideration of clarifications provided in the course of the previous verifications it can be confirmed that w.r.t. the realized technology, the project equipments, as well as the monitoring and metering equipment, the project is still in line as described in the registered PDD.

5.2. Project history

There was no FARs raised during the validation or in the 1st verification of the project activity.

5.3. Special events

In the beginning of April 2008 there was a landslide at the energy control house that affected the energy production; it was completely repaired by the end of the month. This fact was evidenced by interview and by the data of the electricity production from Aquarius Energética S.A. It was also evidenced with photos from the landslide

in the area. As a consequence the electricity production for April 2008 was lower than estimated.

5.4. Compliance with the monitoring plan

The monitoring system and all applied procedures are completely in compliance to the registered monitoring plan.

The reporting procedures reflect the requirements of the monitoring plan. All relevant data is collected continuously every 15 minutes and stored during the whole crediting period and after. The monitoring consists in using meter equipment projected to a registry and verifies the energy generated by the facility. All the energy invoices issued during the monitoring period were checked against the memorandums from Enersul, with the final acceptance of the amount of energy delivered to the grid (for which it accepted to pay for).

5.5. Compliance with the monitoring methodology

The monitoring system is in compliance with the applied monitoring methodology (AMS I.D., version 8).

5.6. Monitoring parameters

During the verification there is only one relevant monitoring parameter (the net energy delivered to the grid - as listed in chapter D.3 of the PDD) and it has been verified with regard to the appropriateness of the applied measurement / determination method, the correctness of the values applied for ER calculation, the accuracy, and applied QA/QC measures. The results as well as the verification procedure are described in the project specific verification checklist.

The validation team assumes that the internal procedure for monitoring the electricity is accurate having evidenced that the internal measurement procedure occurred every 15 minutes and that the calibration certificates of all meters is up to date.

Additionally it could be cross checked with the monthly memorandums from Enersul and the internal metering, which do not presents significant differences. The bi-directional electricity meters used are well known and state of the art. All measured data is collected continuously during the whole monitoring period.

The ex-ante calculated grid emission factor as per registered PDD is fixed throughout the crediting period with 0.5217 tCO2e/MWh and this is the value used in the monitoring report/MR/.

5.7. Monitoring report

A draft monitoring report was submitted to the verification team by the project participants. The team has made this report publicly available prior to the start of the verification activities. No comments were received.

During the verification, mistakes and needs for clarification were identified (see CAR and CLs above). The PP has carried out the requested corrections so that it can be confirmed that the Monitoring report is complete and transparent and in accordance with the registered PDD and other relevant requirements.

5.8. ER Calculation

Calculation of the emission reductions is based on the monitored net electricity delivery to the grid as well as on validated and registered parameters fixed in the PDD for the Brazilian interconnected grid. During the verification no mistake in the ER calculation was identified. In accordance with the methodology no project or leakage emissions are to be considered. Therefore it is confirmed that the ER calculation is overall correct.

5.9. Quality Management

The Management System for the monitoring of the CDM Project is in place. The organizational structure with the responsibilities has been properly identified. The key parameter is measured and reviewed periodically as per the procedures. The electricity meters are calibrated and the certificates were presented to the verification team. Nevertheless in the beginning of the MP the calibration certificates were no longer valid as described the MR table 3. As a consequence the verification team requested the PP (see CAR P1) to use EB52 Annex 60 to apply a correction factor for the electricity data provided in this respective period.

Every month Aquarius Energética S.A. issues an invoice which is usually confirmed by Enersul through a memorandum, usually containing a very slight correction of the amount of energy delivered to the grid, based on the measurements recorded by its own meter which is in a locked up cabinet in Aquarius Energética power house. Based on this information Enersul issues the final invoice.

5.10. Overall Aspects of the Verification

All necessary and requested documentation was provided by the project participants so that a complete verification of all relevant issues could be carried out.

The verification team got access to all relevant documentation regarding the monitoring of the emission reduction calculation, like:

- technical data of the measuring equipment;
- meter readings by Aquarius Energética S.A.;
- monthly confirmation of receipt and memorandums by Enersul;
- calibration certificates;
- measurement devices;

All these documentation were checked and found to be consistent and of high quality.

Access was granted to all installations of the plant which are relevant for the project performance and the monitoring activities.

No issues have been identified indicating that the implementation of the project activity and the steps to claim emission reductions are not compliant with the UNFCCC criteria and relevant guidance provided by the COP/CMP and the CDM EB (clarifications and/or guidance).

5.11. Hints for next periodic Verification

Not applicable. No FAR has been raised during this verification.

6. VERIFICATION OPINION

Aquarius Energética S.A. has commissioned the TÜV NORD JI/CDM Certification Program to carry out the 2nd periodic verification of the project: "Aquarius Hydroelectric Project", with regard to the relevant requirements for CDM project activities. The project reduces GHG emissions due to renewable power regeneration by a run-of river hydro power plant, providing and selling the energy to the regional grid. The installed capacity of the project is 4.2 MW. This verification covers the period from 2008-01-01 to 2009-12-31 (including both days).

In the course of the verification 7 Corrective Action Requests (CAR) and 1 Clarification Requests (CL) were raised and successfully closed. The verification is based on the draft monitoring report, revised monitoring report, the monitoring plan as set out in the registered PDD, the validation report, emission reduction calculation spreadsheet and supporting documents made available to the TÜV NORD JI/CDM CP by the project participant.

As a result of this verification, the verifier confirms that:

- all operations of the project are implemented and installed as planned and described in the validated project design document.
- the monitoring plan is in accordance with the applied approved CDM methodology ,ie, AMS I.D ver. 8
- the installed equipment essential for measuring parameters required for calculating emission reductions are calibrated appropriately.
- the monitoring system is in place and functional. The project has generated GHG emission reductions.

As the result of the 2nd periodic verification, the verifier confirms that the GHG emission reductions are calculated without material misstatements in a conservative and appropriate manner. TÜV NORD JI/CDM CP herewith confirms that the project has achieved emission reductions in the above mentioned reporting period as follows:

Emission reductions: **35,466** t CO_{2e}

Essen, 2010-09-24

Rainer Winter

TÜV NORD JI/CDM Certification Program

Verification Team Leader

Essen, 2010-09-24

Martin Saalmann

TÜV NORD JI/CDM Certification Program

Senior Assessor

7. REFERENCES

Table 7-1: Documents provided by the project participant(s)

Reference	Document
/CCD/	Contract of Connection to the Distribution System – Nº PJU / 089 – CO 05.2005 between ENERSUL and Aquarius Energética S.A. – 2005-05-11
/LTA/	1. Technical Calibration Certificate – Nº 030/EOP/06 issued by ENERSUL – Main Monitoring Equipment 43273994 – 2006-07-17. 2. Technical Calibration Certificate – Nº 031/EOP/06 issued by ENERSUL – Main Monitoring Equipment 43273997 – 2006-07-17. 3. Technical Calibration Certificate – Nº 028/ENOEM/09 and 030/ENOEM/09 issued by ENERSUL – Main Monitoring Equipment 43273994 – 2009-04-08 – valid for three years 4. Technical Calibration Certificate – Nº 029/ENOEM/09 and 031/ENOEM/09 issued by ENERSUL – Active Backup Monitoring Equipment 43273997 – 2009-04-08 – valid for three years
/MAN/	1. Standard Operational Procedure Nº 1 – SHP Aquarius – 2006-09-20 (internal operation procedures) 2. Standard Operational Procedure Nº 2 – SHP Aquarius – 2006-09-22 (internal operation and safety procedures) 3. Standard Operational Procedure Nº 3 – SHP Aquarius – 2006-09-20 (internal operation procedures) 4. Technical specifications of synchronous generator – Model: SPD 710 – Serial Number: 145473 and 145474 – WEG – 2006-03-28 5. Operation and Maintenance Manual – Turbine – Document Nº 3300-33/06.01 – PCH Aquarius – December 2006 (internal manual of turbines operation and maintenance) 6. Operation Manual – SHP Aquarius – February 2007 (internal manual of operation) 7. Control and Treatment of Human Errors Manual – SHP Aquarius – February 2007 (internal manual to prevent human mistakes and operation risks) 8. Maintenance Instructions Manual – SHP Aquarius – September 2007 (internal manual with maintenance instructions of equipments) 9. Technical specifications of the monitoring equipment Electronic

Reference	Document
	Multimeasurement Meter QUANTUM 1000® - Itron – Publication: 100201SP-03
/**MCAL**/	Mail from Itron Engineer about the calibration maxim error, on 2010-07-05.
/**MR**/	2nd CDM Draft Monitoring Report –Aquarius Hydroelectric Power – version 1 - 2010-02-10 – Monitoring Period from 2008-01-01 to 2009-12-31 2nd CDM Draft Monitoring Report –Aquarius Hydroelectric Power – version 2 - 2010-03-15 – Monitoring Period from 2008-01-01 to 2009-12-31 2nd CDM Draft Monitoring Report –Aquarius Hydroelectric Power – version 3 - 2010-04-30 – Monitoring Period from 2008-01-01 to 2009-12-31 2nd CDM Monitoring Report –Aquarius Hydroelectric Power – version 4 - 2010-07-14 – Monitoring Period from 2008-01-01 to 2009-12-31 2nd CDM Monitoring Report –Aquarius Hydroelectric Power – version 5 - 2010-07-14 – Monitoring Period from 2008-01-01 to 2009-12-31
/**OL**/	1. Operation License – Nº 557/2006 – issued by Brazilian Institute of Environment and Renewable Natural Resources (IBAMA) – 2006/08/22 – valid for five years 2. Operation License issued by Town Hall of Sonora – 2010-02-18 – valid until 2010-12-31 3. Sanitary License – Nº 79.053/10 issued by Town Hall of Sonora – valid until 2010-12-31
/**PPA**/	Power Purchase Agreement – CT – PROINFA / PCH-MRE – 038/2004 between ELETROBRÁS and Companhia Agrícola Sonora Estância – 2004-06-30
/**REP**/	Incident Report: internal monthly report of all incidents that may cause changes in the production of energy from January 2008 to December 2009
/**RTF**/	PCH Aquarius *month year*.rtf – electricity generation report issued by ENERSUL in a 15 minutes data basis (Word format)
/**SHP**/	SHP Aquarius Quantitative of personal SHP Aquarius Organizational Structure
/**XLS**/	MGM Aquarius workbook version 1 - Feb 2010 – electricity generation and emission reductions calculation spreadsheet MGM Aquarius workbook version 2 – April, 30th 2010 – electricity generation and emission reductions calculation spreadsheet
/**XLS1**/	PCH Aquarius *month year*.xls – electricity generation report issued by

Reference	Document
	ENERSUL in a 15 minutes data basis (Excel format)

Table 7-2: Background investigation and assessment documents

Reference	Document
/**AMS-I.D.**/	AMS-I.D. – Grid Connected Renewable Electricity Generation - version 8.
/**CPM**/	TÜV NORD JI / CDM CP Manual (incl. CP procedures and forms)
/**IPPC**/	1. 1996 IPCC Guidelines for National Greenhouse Gas Inventories: work book 2. 2006 IPCC Guidelines for National Greenhouse Gas Inventories: work book
/**GCFR**/	Guidelines for assessing compliance with the calibration frequency requirements. (EB 52, Annex 60).
/**KP**/	Kyoto Protocol (1997)
/**MA**/	Decision 3/CMP. 1 (Marrakesh – Accords)
/**PDD**/	Registered Project Design Document for CDM project: "Aquarius Hydroelectric Project" version 3 – 2006-08-26
/**VAL**/	Validation Report for CDM project "Aquarius Hydroelectric Project in Brazil" Nº 2003-0506 – September 2006 issued by DNV.
/**VER**/	1st Verification Report for CDM project "Aquarius Hydroelectric Project in Brazil" Nº 2008-0376 – April 2008 issued by DNV.
/**VVM**/	UNFCCC Validation and Verification Manual (version 01.1, Annex 03; EB 51)

Table 7-3: Websites used

Reference	Link	Organisation
/**ipcc**/	www.ipcc-nggip.iges.or.jp	IPCC publications

Reference	Link	Organisation
/**itron**/	http://www.itron.com/ http://www.actaris.com.br/	Itron (metering equipment provider)
/**ons**/	http://www.ons.org.br	National operator of the electrical system
/**unfccc**/	http://cdm.unfccc.int	UNFCCC
/**weg**/	http://www.weg.net/	WEG (equipment provider)

Table 7-4: List of interviewed persons

Reference	MoI[1]		Name	Organisation / Function
/**IM01**/	V	☒ Mr. ☐ Ms	Marcelo Contini	Aquarius / Accounting Manager
/**IM01**/	T	☒ Mr. ☐ Ms	Luiz Antonio F. Cardoso	Aquarius / Supervisor
/**IM01**/	V	☒ Mr. ☐ Ms	Celso Rodrigues da Silva	Aquarius / Chief of the Substation
/**IM01**/	V	☒ Mr. ☐ Ms	Celso Rodrigues da Silva Júnior	Aquarius / Substation Operator
/**IM02**/	E, V	☐ Mr. ☒ Ms.	Flávia Rocha Santos	MGM International / Consultant

[1)] Means of Interview: (**T**elephone, **E**-Mail, **V**isit)

ANNEX

A1: Verification Protocol

A2: Appointment / Authorisation statements

ANNEX 1: VERIFICATION PROTOCOL

Table A-1: GHG calculation procedures and management control testing / detailed audit testing of residual risk areas and random testing

Identification of potential reporting risk	Identification, assessment and testing of management controls	Areas of residual risks	Additional verification testing	Conclusions and Areas Requiring Improvement (including *Forward Action Requests*)
Raw data generation				
• Installation of measuring equipment • Dysfunction of installed equipment • Wrong operation by operational personnel • Downtimes of equipment • Exchange of equipment • Change of measurement equipment characteristic • Insufficient accuracy	• Installation of modern and state of the art equipment • Process control automation. • Internal data review • Regular visual inspect-ions of installed equip-ment • Only skilled and trained personnel operates the relevant equipment • Daily raw data checks • Immediate exchange of dysfunctional equipment • Stand-by duty is	• Inadequate installation / operation of the monitoring equipment. • Inadequate exchange of equipment. • Change of personnel • Undetected measurement errors • Inappropriateness of Management system procedures w.r.t. monitoring plan requirements (e.g. substitute value strategies) • Non-application of management system procedures • Insufficient accuracy	• Site – visit (maintenance dept.) • Check of equipment • Check of technical data sheets • Check of calibration records, if applicable • Check of maintenance records • Counter-check of raw data and commercial data • Check of CDM management system • Check of CDM related procedures	• **See Table A-2**

Identification of potential reporting risk	Identification, assessment and testing of management controls	Areas of residual risks	Additional verification testing	Conclusions and Areas Requiring Improvement (including *Forward Action Requests*)
• Change of technology	organized • Training • Internal audit procedures		• Application of CDM management system procedures • Check of trainings • Check of responsibilities	
Raw data collection and data aggregation				
• Wrong data transfer from raw data to daily and monthly aggregated reporting forms • IT Systems • Spread sheet programming • Manual data transmission • Data protection • Responsibilities	• Cross-check of data • Plausibility checks of parameter. • Appropriate archiving system • Clear allocation of responsibilities • Application of CDM Management system procedures • Usage of standard software solutions (Spreadsheets) • Limited access to IT systems • Data protection	• Unintended usage of old data that has been revised • Incomplete documentation • Ex-post corrections of records • Ambiguous sources of information • Non-application of management system procedures • Manual data transfer mistakes • Unintended change of spread sheet programming or data base entries • Problems caused by	• Check of data aggregation steps • Counter-calculation • Data integrity checks by means of graphical data analysis and calculation of specific performance figures • Check of management system certification • Check of data archiving system • Check of application of Management system procedures	• **See Table A-2**

Identification of potential reporting risk	Identification, assessment and testing of management controls	Areas of residual risks	Additional verification testing	Conclusions and Areas Requiring Improvement (including *Forward Action Requests*)
	procedures	updating/upgrading or change of applied software		
Other calculation parameters				
• Emission factors.	• The values and data sources applied are defined in the PDD and monitoring plan.	• Unintended or intended Modification of calculation parameters • Wrong application of values • Misinterpretations of the applied methodology and/ or the PDD.	• Countercheck of the applied MP in the MR against the methodology and the PDD	• **See Table A-2**
Calculation Methods				
• Applied formulae • Miscalculation • Mistakes in spread-sheet calculation	• Advanced calculation and reporting tools • Usage of tested / counterchecked Excel spreadsheets	• The danger of mis-calculation can only be minimized.	• Countercheck on the basis of own calculation. • Spread sheet walk-trough. • Plausibility checks	• **See Table A-2**
Monitoring reporting				
• Data transfer to the author of the monitoring report	• An experienced person consultant is responsible for	• The danger of data transfer mistakes can only be minimized	• Counter check with evidences provided. • Audit of procedure	• **See Table A-2**

Identification of potential reporting risk	Identification, assessment and testing of management controls	Areas of residual risks	Additional verification testing	Conclusions and Areas Requiring Improvement (including *Forward Action Requests*)
• Data transfer to the monitoring report • Unintended use of outdated versions	monitoring reporting.		application	

Table A-2: (Project specific) Periodic Verification Checklist

Checklist Item (incl. guidance for the verification team)	**Reference**	**Verification Team Comments** (Means and results of assessment)	**Draft Concl.**	**Final Concl.**
1. Project history				
1.1 Open issues from validation ***(EB 51 Annex 3 §§ 180, 187 (c))*** *Check (esp. in case of 1st periodic verification) whether there are any open issues indicated in the validation report (e.g. FAR)?*	/VAL/	Not applicable once it is a 2nd verification.	N.A	N.A
1.2 Open issues from previous verification ***(EB 51 Annex 3 § 217 (g))*** *Check in case of further periodic verifications whether there are any open issues indicated in previous verification (FAR)?*	/VER/	Not applicable. There is no FAR from the previous verification.	N.A	N.A
1.3 Requests for Deviations / Revisions of MP (EB 51 Annex 3, §§ 200, 211) *Check if there have been any requests for deviations from the registered monitoring plan or requests for revisions of the monitoring plan. If any, make sure that the monitoring report reflects the application of the approved guidance from the CDM EB regarding the Rfdev. and that those issues are subject to verification?*	/unfccc/ /PDD/	*Description:* During the first verification there was a request for review on the verification report issued on 2008/09/11. The responsible DOE and PP clarified the issued on 2008/10/24 and 2008/09/23 respectively. A Request for Deviation or Revision of the MP was not opened before and during this MP. *Justification of evidences:* UNFCCC website, project monitoring plan and request for review forms had been checked accordingly. Furthermore, during the site visit clarifications requested during the first verification period were checked by the audits responsible to guarantee no deviations of the monitoring plan.	OK	OK

Checklist Item (incl. guidance for the verification team)	**Reference**	**Verification Team Comments** (Means and results of assessment)	**Draft Concl.**	**Final Concl.**
		Conclusion: No Request for Deviation or Revision of the MP occurred or was necessary during this verification.		
1.4 Initial verification *In case an initial verification has been carried out, check if all FARs, recommendations etc. have been addressed appropriately.*	/unfccc/	*Description:* Not applicable. No initial verification has been carried out. *Justification of evidences:* *Conclusion:*	N.A	N.A
1.5 Initial project implementation ***(EB 51 Annex 3, §§ 181 b (i), D. 1. (i) 1, – 194, 200)*** *In case of first periodic verification: Assess whether the project has been implemented and operated as per the registered PDD and are all physical features of the project in place? Further focus on the potential phase wise implementation and report on the corresponding statuses and starting dates accordingly.* *Also, discuss –if applicable- any approvals of the necessary request of notification or request for approval of changes from the project activity as described in the registered PDD (EB 48 Annex 66/67).* *In case of further periodic verifications: Go to next chapter.*		Not applicable, once it is a 2nd Verification. Furthermore, no relevant discrepancies were identified between the registered PDD and the project activity operation mode. The project is fully implemented and operational as described in the registered PDD.	OK	OK
2. Update on Changes and Incidents (during the Monitoring Period)				

Checklist Item (incl. guidance for the verification team)	**Reference**	**Verification Team Comments** (Means and results of assessment)	**Draft Concl.**	**Final Concl.**
a. Technical equipment ***(EB 51 Annex 3, § 186)*** *Check if relevant technical equipment of the project activity has been exchanged or modified during the monitoring period.* *Consider e.g. interviews with operational personnel, QMS records, maintenance records, instrument specifications.* *In case of changes, check whether the project is still in line with the registered PDD and assure that these changes have been considered in the monitoring report and the emission reduction calculation.* *Also, discuss –if applicable- any approvals of the necessary request of notification or request for approval of changes from the project activity as described in the registered PDD (EB 48 Annex 66/67).*	/IM01/ /MAN/	*Description:* No relevant equipment was exchanged within the monitoring period. *Justification of evidences:* It was evidenced during the on site visit, checking the equipments and instrument specifications. *Conclusion:* No relevant equipment was exchanged during the 2nd monitoring period.	OK	OK
b. Operation modes ***(EB 51 Annex 3, §§ 187, 194)*** *Check if relevant operation modes of the project activity have been exchanged or modified during the monitoring period.* *Consider e.g. interviews with operational personnel, operation log sheets, data management system records.* *In case of changes, check whether the project is still*	/IM01/	*Description:* No relevant operation modes were exchanged within the monitoring period. *Justification of evidences:* It was evidence by means of interviews with the operational personnel and review of operating procedures and manuals *Conclusion:* No discrepancies were found in this item.	OK	OK

Checklist Item (incl. guidance for the verification team)	**Reference**	**Verification Team Comments** (Means and results of assessment)	**Draft Concl.**	**Final Concl.**
in line with the registered PDD and assure that these changes have been considered in the monitoring report and the emission reduction calculation. *Also, discuss –if applicable- any approvals of the necessary request of notification or request for approval of changes from the project activity as described in the registered PDD (EB 48 Annex 66/67).*				
2.3 Incidents ***(EB 51 Annex 3, § 186)*** *Identify if there have been any significant incidents, deviant operation modes and / or downtimes of the equipment?* *Consider e.g. interviews with operational personnel, operational log sheets, analysis of performance data.*	/IM01/ /REP/	*Description:* In the beginning of April 2008 there was a landslide at the energy control house, and it was completely repaired by the end of the month. This incident affected the energy production on this month. *Justification of evidences:* This fact was evidenced by interview and by the data of the electricity production from Aquarius Energética S.A. It was also evidenced with photos from the landslide in the area. *Conclusion:* Verification team could conclude that there was a landslide in the area that really affected the energy production and generation on April 2008. As a result less energy was produced in this month than estimated in the PDD.	OK	OK
2.4 Personnel *Identify, if relevant personnel w.r.t. monitoring has been exchanged?* *In case of changes, assure that the implemented*	/IM01/ /MAN/	*Description:* The monitoring responsible persons have been exchanged since the beginning of the verification in the project activity.	OK	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
monitoring procedures have not been affected.		*Justification of evidences:* It was evidenced by means of interview with the personal responsible in the area. *Conclusion:* As the new personnel has received training and there are manuals for the operation/monitoring procedures, the personnel exchange did not affected the monitoring of the project activity.		
2.5 Legislation Find out whether relevant legislation with effect on the project activity in the host country has been changed.	/IM01/ /OL/	*Description:* Relevant legislation was considered in the project activity. *Justification of evidences:* Operational, Sanitary and Municipality licenses were verified during the site visit. Connexion and Concession contract between Aquarius Energética S.A ENERSUL and ELETROBRÁS respectively were also verified by the audit team. *Conclusion:* No relevant legislation in the host country since the last verification had been changed.	OK	OK
3. Monitoring Report – General				
3.1 Monitoring period *Check if the monitoring period is in line with a) the crediting period and/or b) previous monitoring periods?*	/MR/ /unfccc/	*Description:* The monitoring period is from 2008-01-01 to 2009-31-12, both days included. *Justification of evidences:* The previous monitoring period was 2006/15/12 to 2007/12/31,	OK	OK

Checklist Item (incl. guidance for the verification team)	**Reference**	**Verification Team Comments** (Means and results of assessment)	**Draft Concl.**	**Final Concl.**
		as verified at UNFCCC website. The crediting period is from 2008/01/01 to 2009/12/31. Conclusion: The current monitoring period is in line with the crediting period and the previous monitoring plan.		
3.2 Publication of the Monitoring Report ***(EB 51 Annex 3, § 174 (i))*** *Check if the monitoring report has been made publicly available on the UNFCCC website before the verification commenced.*	/unfccc/	*Description:* The MR was published on March 8th 2010 at the UNFCCC website and the 2nd verification visit was on April 7th 2010. *Justification of evidences:* UNFCCC website was checked accordingly. *Conclusion:* The MR has been made publicly available four weeks before the on-site visit. This is in line with the UNFCCC requirements. No comments have been received.	OK	OK
3.4 References *Check if the monitoring report provides the correct references, in detail: project title, UNFCCC registration No., applied methodology/ies, meth tools.*	/MR/ /PDD/ /unfccc/ /AMS-I.D/	*Description:* Some references are given in the monitoring report. UNFCCC registration No. is 0627 and methodology applied is AMS-I.D – Renewable Electricity Generation for a grid, version 8. However see CL R1 below. *Justification of evidences:* Monitoring report was reviewed in detail and compared against project documentation on UNFCCC website. *Conclusion:* **(CL R1)** At the front page and in sections 1, 13 and 14, please	~~CL R1~~	OK

Checklist Item (incl. guidance for the verification team)	**Reference**	**Verification Team Comments** (Means and results of assessment)	**Draft Concl.**	**Final Concl.**
		include the statement "both days are included" after the described monitoring period.		
3.3 Completeness ***(EB 51 Annex 3, §§ 181, 194, 201 (b))*** *Assess if the monitoring report is complete, i.e. have all relevant issues been addressed? The MR shall include: (i) The implementation status of the project during the monitoring period (ii) Monitoring systems and procedures incl. QA/QC system employed (iii) all parameters to be monitored and reported at the intervals required by the MP and the Meth (iv) information on calibration of monitoring instruments (v) Emission factors, IPCC default values etc. (vi) reference to any deviation request approved by the EB, (vii) calculation of ER including reference to formulae and methods used (viii) comparison of the actual ER claimed in the MP with the estimate in the registered PDD and explanation in case of significant increase.*	/MR/	Most relevant issues are covered: ☒ (i) Implementation status ☒ (ii) Monitoring systems and procedures (esp. QA/QC) ☒ (iii) All parameters and corresponding intervals ☒ (iv) Information on calibration of monitoring instruments ☒ (v) Emission factors, IPCC default values etc. ☐ (vi) Reference to deviations, if applicable ☒ (vii) Calculation of emission reductions ☐ (viii) Comparison of ER with PDD estimation However CL U1 was raised: **(CL U1)** The following issues shall be corrected in the monitoring report: 1. please include a comparison of the actual ER claimed in the monitoring period with the estimate in the registered PDD and explanation in case of significant increase; 2. correct serial number of the principal monitoring equipment in table 2.	~~CL U1~~	OK
3.5 Transparency *Assess if the monitoring report is transparent, i.e.*	/MR/	*Description:*	~~CL U1~~ ~~CL R1~~	OK

Checklist Item (incl. guidance for the verification team)	**Reference**	**Verification Team Comments** (Means and results of assessment)	**Draft Concl.**	**Final Concl.**
clear and unequivocal in all respect?		It is necessary to close **CL U1 and CL R1** in order to provide an assessment. *Justification of evidences:* *Conclusion:*		
3.6 Misstatements on general issues *Assess whether the monitoring report is free of material misstatements regarding issues other than the monitoring parameters.* *Discuss the monitoring parameters in detail in chapter "Monitoring Parameters".*	/MR/	*Description:* It is necessary to close **CL U1 and CL R1** in order to provide an assessment. *Justification f evidences:* *Conclusion:*	~~CL U1 CL R1~~	OK
3.7 Deviations from the validated monitoring plan (EB 51 Annex 3, §187) *Assess whether the MR is in line with the validated monitoring plan?* *In case of intended changes: Have they been approved by the UNFCCC?*	/MR/ /PDD/ /VAL/ /MAN/	*Description:* No deviations from the validated monitoring plan have been identified. *Justification of evidences:* Unfccc website, project activity monitoring plan and request for review forms had been checked accordingly. Furthermore, during the site visit, clarifications requested during the first verification period were checked by the audits responsible to guarantee no deviations of the monitoring plan. During on site visit, operational manuals had also been checked by the verification team. *Conclusion:*	OK	OK

Checklist Item (incl. guidance for the verification team)	**Reference**	**Verification Team Comments** (Means and results of assessment)	**Draft Concl.**	**Final Concl.**
		No discrepancies were found in this item. The MR is in line with the MP.		
3.8 Deviations from the approved methodology (EB 51 Annex 3, §§ 187, 195, 196) *Assess whether the MR in line with the applied monitoring methodology?*	/MR/ /AMS-I.D/	*Description:* No deviations from the approved methodology have been identified. *Justification of evidences:* MR was cross checked against the applied methodology AMS-I.D: Grid Connected Renewable Electricity Generation - version 8. *Conclusion:* No discrepancies had been identified in this item.	OK	OK
4. Monitoring Parameters *(List all parameters of the PDD chapter B.7.1; pl. copy the 6 lines below for each parameter)*				
4.1. EG		**Description:** Electricity supplied to the grid (KWh)		
a) Measurement / Determination method ***(EB 51 Annex 3, §§ 183, 184, 201 (c), 202)*** *Describe how the monitoring parameter was measured / determined.* *Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard*	/IM01/ /PDD/ /AMS-I.D/ /PPA/ /LTA/	*Description:* The delivered electricity is measured and recorded by one main meter (Meter Q1000 / 43273994) and one backup meter (Meter Q1000/ 43273997) which are owned by ENERSUL (who is responsible for the measurements of electricity supplied by Aquarius and reports the electricity by "Aquarius Hydroelectric Project" to CCEE and Eletrobrás, the buyer of the electricity	~~CAR P1~~	OK

Checklist Item (incl. guidance for the verification team)	**Reference**	**Verification Team Comments** (Means and results of assessment)	**Draft Concl.**	**Final Concl.**
equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements. *Assess whether the measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology.*	/RTF/ /XLS/	according to the PROINFA program). Both meters are sealed. Every month, ENERSUL provides to Mr. Luis Antonio (Electricity Engineering responsible and project supervisor) the measured data, who prepares the monthly invoices which are submitted to ELETROBRÁS. There is a monthly comparison between energy generated (by Aquarius Energética S.A.) and energy supplied (by ENERSUL), that is delivered to the grid. *Justification of evidences:* Measurement equipments were verified in Aquarius Energética and in ENERSUL. Calibration certificates from principal and back up meters were also checked. Furthermore, reports from ENERSUL and sales receipts from ELETROBRÁS were evidenced and cross checked during the audit. *Conclusion:* No discrepancies were found in the EG values during the period from 2008/01/01 to 2009/31/12. However, **CAR P1** was raised about the frequency calibration. **(CAR P1)** According to EB 52, annex 60, in cases neither the monitoring methodology neither the monitoring plan specify any requirement for calibration frequency, equipments shall be calibrated according specifications of the local/national standards or as per the manufacturer specification. It is stated in the registered validation report, in CAR 3 response, that equipments will be calibrated every 2 years. As observed in the calibrate certificates and as stated in the		

Checklist Item (incl. guidance for the verification team)	**Reference**	**Verification Team Comments** (Means and results of assessment)	**Draft Concl.**	**Final Concl.**
		monitoring report, equipment are calibrated every 3 years. According to ONS (National operator of the electrical system), measurement equipment shall be calibrated every two years. Clarification and correction is requested about the calibration frequency specified in the monitoring report.		
b) Correctness ***(EB 51 Annex 3, §§ 201 (b), 202, 205 (d))*** *Determine whether the value given in the monitoring report is correct and sufficiently justified.* *In case of mistakes pl. provide details and descriptions of the CARs raised.*	/MR/ /RTF/ /XLS/	☒ Correct ☐ Not correct *Description:* The values given in the monitoring report and the corresponding Excel sheets are correct. *Justification of evidences:* Values in MR were cross checked against electricity generation report issued by ENERSUL/RTF/ in a 15 minutes data basis. Conclusion: No discrepancies were found in this item.	OK	OK
c) QA/QC Procedure ***(EB 51 Annex 3, §§ 181, 201 (c), 202)*** *Describe whether all applicable QA/QC procedures are met. Assess further if the calibration and maintenance of the monitoring equipment has been carried out by competent personnel.*	/MR/ /IM01/ /LTA/ /RTF/ /XLS/	*Description:* The QA/QC procedure described in the registered monitoring plan was correctly followed. EG is measured and recorded every 15 minutes. *Justification of evidences:* Monitoring Plan was checked by the verification team and it was double checked with the ENERSUL data recorded. EG is measured every 15 minutes and a monthly report is sent to the project supervisor (Mr. Luis Antonio). Furthermore, these reports	~~CAR P1~~	OK

Checklist Item (incl. guidance for the verification team)	**Reference**	**Verification Team Comments** (Means and results of assessment)	**Draft Concl.**	**Final Concl.**
		were checked during the verification audit. It was also evidenced calibration certificates of: • Meter Q1000/43273994 (main) • Meter Q1000/43273997 (backup) Calibrations were carried out by duly approved personnel / organisations. *Conclusion:* The verification team had concluded by evidences presented that QA/QC procedures were performed accordingly. However, for an appropriate assessment, **CAR P1** shall be closed.		
d) Accuracy ***(EB 51 Annex 3, §§201 (c), 202, 205(a))*** *In case of measured (or estimated) values, check whether significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.*	/MR/ /IM01/ /LTA/ /XLS/ /XLS1/	*Description:* The last calibration of the meters owned by ENERSUL was in April 2009. *Justification of evidences:* All calibration certificates of the main and backup meters were checked during the verification audit. *Conclusion:* Calibrated certifications were checked accordingly; however it is necessary to close **CAR P1 and CL C1** in order to provide an assessment. **(CL C1):** The following issues shall be corrected at ER	~~CAR P1 CL C1~~	OK

Checklist Item (incl. guidance for the verification team)	**Reference**	**Verification Team Comments** (Means and results of assessment)	**Draft Concl.**	**Final Concl.**
		Calculation: • Please, eliminate unnecessary values in the spreadsheet, keeping only the figures related to the monitoring period (from January 2008 to December 2009); • For conservative reasons, the CER values in Excel spreadsheet shall be rounded down and shall be used hundredth decimal point for Electricity Generation and Emission Reduction values. These figures are the ones to be copied to Table 4 and 5 (sections 13 and 14, respectively) of the Monitoring Report.		
e) Verification ***(EB 51 Annex 3, §§ 183 (a), 183 (b), 185, 202, 204, 205(b))*** *Describe how the information flow (from data generation, aggregation, to recording, calculation and reporting) for these parameters including the value was verified. Consider the measurement / determination procedure, accuracies, QA/QC procedures. Consider as well plausibility checks as far as possible. Check if the applied value could be backed up by corresponding evidences (external / internal, oral or documented). Further whether sufficient evidence is available, both in terms of frequency (time period between evidence) and in covering the full monitoring period.*	/IM01/ /LTA/ /RTF/ /XLS/ /XLS1/	*Description:* The energy generated in Aquarius Energética is transmitted to a substation belonging to ENERSUL, where the monitoring meters are installed. This meter is connected to CCEE that is responsible for accounting the supplied energy. The measurements of the energy generated is reported and recorded every 15 minutes. The verification team has reviewed and cross checked the Aquarius Energética S.A. energy generation records, ENERSUL energy supplied and sales records (invoices). During the on-site visit the operation of installed meters have been observed. For purpose of plausibility check meter readings and photos of the installed equipment have been taken. The accuracy of the installed equipment has been checked on the basis of calibration certificates which were evidenced.	~~CAR P1~~	OK

Checklist Item (incl. guidance for the verification team)	Reference	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
		Justification of evidences: Electricity generation report issued by ENERSUL in a 15 minutes data basis was cross checked with the data provided in the monitoring report for ER calculation. Calibration certificates were also verified to guarantee the trustworthiness of the data. *Conclusion:* However, **CAR P1** shall be closed for an appropriate assessment.		
5. ER Calculation				
5.1 Traceability ***(EB 51 Annex 3, §181)*** *Assess if the calculation is fully traceable. In case of complex calculations an Excel calculation spread-sheet shall be used. All applied formulae must be visible.*	/XLS/ /XLS1/ /AMS-I.D/	*Description:* An Excel calculation sheet was used. The calculation is completely traceable. The calculation is fairly simple; consisting in the net electricity (monthly recorded by ENERSUL for the verification period) multiplied by the EF validated ex-ante. *Justification of evidences:* An unprotected Excel spreadsheet was provided to the auditors. Formula applied was cross checked with the methodology applied. *Conclusion:* Calculation is totally traceable and is according the methodology AMS-I.D version 8.	OK	OK
5.2 Parameter consistency	/MR/ /XLS/	*Description:* The Excel – calculation sheet is completely in line with the MR.	OK	OK

Checklist Item (incl. guidance for the verification team)	**Reference**	**Verification Team Comments** (Means and results of assessment)	**Draft Concl.**	**Final Concl.**
(EB 51 Annex 3, §187 (b)) *Assess whether all internal and external parameters and data used for calculation are applied consistently in the monitoring report and the calculation spreadsheet?* *Consider only the correct data exchange between the monitoring report and the calculation spreadsheet (if any). The evaluation of the correctness of the parameter values itself should be discussed in the chapter "Monitoring Parameters".*	/XLS1/	No deviant parameter values have been used in the calculation sheet. *Justification of evidences:* Monitoring plan was cross checked with the Excel – calculation sheet. EG values are consistent with the evidences presented (reports, sheets, and others) *Conclusion:* All parameters (Excel calculation and MR) are consistent with each other.		
5.3 Applied formulae ***(EB 51 Annex 3, §§ 203, 204(c), 205(c))*** *Check if the applied formulae and methods for calculating baseline emissions, project emissions and leakage are in accordance with the monitoring plan and / or the approved methodology.*	/AMS-I.D/ /XLS/ /XLS1/	*Description:* All applied formulae are in accordance with the monitoring plan and the approved methodology as well. *Justification of evidences:* Monitoring plan and AMS-I.D version 8 were detailed cross checked. *Conclusion:* No discrepancies were found in this item.	OK	OK
5.4 Completeness of calculation ***(EB 51 Annex 3, § 204 (a))*** *Assess whether the provided calculations are complete and reflect all requirements of the monitoring plan.*	/XLS/ /XLS1/ /MR/ /PDD/	*Description:* The calculation is completed and reflects all requirements of the monitoring plan. Nevertheless the final ER need to be rounded down. See CL C1 *Justification of evidences:*	~~CL C1~~	OK

Checklist Item (incl. guidance for the verification team)	**Reference**	**Verification Team Comments** (Means and results of assessment)	**Draft Concl.**	**Final Concl.**
Check especially that no standard or old values have been used for calculation where calculations based on up-to-date data is required.		Monitoring plan and AMS-I.D version 8 were detailed cross checked. *Conclusion:* **CL C1** was raised.		
6. Quality Management; defined organisational structure, responsibilities and competencies Internal QA/QC and document control				
6.1 Management System ***(EB 51 Annex 3, §181 a (iii))*** *Check if the GHG data monitoring system is embedded in a (certified) company quality management system, if so, check if all CDM monitoring procedures been fully integrated in the project participant's quality management system. If not how the GHG management system has been implemented.*	/IM01/ /MAN/	*Description:* Although there is no certified quality management system in place, in order to guarantee the implementation of the monitoring system there are written procedures and manuals for operation and maintenance of the project activity that must be followed. *Justification of evidences:* Procedures and operational manuals were verified during the visit. Furthermore, interview with the SHP supervisor was performed. *Conclusion:* There is no certified quality management system, but there are written procedures and manuals to guarantee the QA/QC of the monitoring procedures.	OK	OK
6.2 Roles and Positions	/IM01/	*Description:*	OK	OK

Checklist Item (incl. guidance for the verification team)	**Reference**	**Verification Team Comments** (Means and results of assessment)	**Draft Concl.**	**Final Concl.**
Check if all roles and positions of each person in the GHG data management process are clearly defined and implemented, from raw data generation to submission of the final data. *Check further if only duly qualified personnel is involved in the monitoring procedures.*	/SHP/	Position of each person is defined by the organizational structure of the company and the memorandum of personal quantitative. Responsibilities for measurements, collection and compilation of data, data storage and archiving are carried out by Celso Rodrigues da Silva Junior and the responsible of the operation and maintenance is Mr. Celso Rodrigues da Silva. Mr. Luis Antonio F. Cardoso is the electricity engineering responsible for the supervision of the activities. *Justification of evidences:* Organizational structure and Quantitative of the personal from Aquarius SHP had been verified by the audit during the visit. *Conclusion:* Roles and positions are well defined and all appointed persons involved are duly qualified.		
6.3 Trainings *Check if initial trainings have been carried out, in case deemed necessary.*	/IM01/	*Description:* Although the operation of the power houses is fairly simple due to the simplicity of the instruments and procedures, for initial operation the manufacturer of the turbines and generators offered training for the equipment operation, and after installation Aquarius Energética supervisor offered specific operational and maintenance trainings to the responsible employees of the area. *Justification of evidences:* It could be evidenced by means of interviews with the project supervisor and operators.	OK	OK

Checklist Item (incl. guidance for the verification team)	**Reference**	**Verification Team Comments** (Means and results of assessment)	**Draft Concl.**	**Final Concl.**
		Conclusion: Trainings had been offered in the beginning of the SHP operation and can be carried out whenever they are necessary.		
6.4 Troubleshooting procedures *Assess whether troubleshooting procedures have been implemented.*	/IM01/ /MAN/	*Description:* There are operating instructions implemented by the engineering responsible, in case any problem occur during the activity of the SHP. *Justification of evidences:* Manuals have been checked and furthermore interview with the engineering responsible was performed during the visit. *Conclusion:* Troubleshooting procedures have been implemented.	N.A	N.A
6.5 Maintenance procedures Are appropriate maintenance procedures in place?	/IM01/ /MAN/	*Description:* Preventive maintenance has been performed by the manufacturer of the equipments (turbines, generators, etc) at least once in two years. Intern inspection is done according to the operation manuals. There are a Maintenance Instruction Manual (internal manual with maintenance instruction of equipments) and a form which is daily filled out by the power house operators (with data of turbine/ pressure/hydraulic bomb). *Justification of evidences:*	OK	OK

Checklist Item (incl. guidance for the verification team)	**Reference**	**Verification Team Comments** (Means and results of assessment)	**Draft Concl.**	**Final Concl.**
		Procedures/ operation manual and preventive maintenance reports from the equipments had been verified. Daily records were also checked during the visit. *Conclusion:* Appropriate maintenance procedures are taken in Aquarius SHP operation.		
6.6 Internal QA/QC *Assess whether there are any procedures in place on when, where and how checks and reviews are to be carried out, and what evidence needs to be documented? (This might include spot checks by a second person not performing the calculations over manual data transfers, changes in assumptions and the overall reliability of the calculation processes.)*	/IM01/ /XLS/ /RTF/	*Description:* The counter-checking of the energy generated is carried out by Aquarius Energética supervisor, Mr. Luis Antonio and ELETROBRÁS. Every month, ENERSUL provides to Mr. Luis Antonio the measured data of its meter at Aquarius Energética, who prepares the monthly invoice, which is submitted to ELETROBRÁS. Furthermore, ELETROBRÁS also receives monthly a spreadsheet with the energy generated in the SHP. *Justification of evidences:* Receipts and invoices from ELETROBRÁS were detailed checked by the verification team. Furthermore, was also checked the reports from ENERSUL send to Mr. Luis Antonio, to verify the values and procedures. *Conclusion:* The audit team could verify that there is an intern procedure that guarantees the reliability of the data.	OK	OK
6.7 Data archive	/IM01/	*Description:*	OK	OK

Checklist Item (incl. guidance for the verification team)	**Reference**	**Verification Team Comments** (Means and results of assessment)	**Draft Concl.**	**Final Concl.**
Check whether all records of monitoring parameters are archived according to the monitoring plan.	/XLS/ /RTF/	All relevant monitoring data was available and recorded since the beginning of the SHP operation. Procedures are in place so that relevant monitoring data will be retained at historical archives of the company. *Justification of evidences:* Interview with the SHP supervisor was performed to guarantee that monitoring parameters are archived accordingly. Furthermore, reports were checked and it was confirmed that measurements are recorded each 15 minutes, as describe in the monitoring plan. *Conclusion:* An adequate data archive is in place. No discrepancies were found in this item.		
6.8 Data protection Assess whether appropriate measures have been take in order to avoid unintended or intended manipulation of the measured data.	/IM01/ /XLS/ /RTF/	*Description:* ENERSUL meter is locked to preserve its integrity and measurements are taken daily. Furthermore, the corrected amount of energy described in ENERSUL's memoranda, is the amount which is finally invoiced and therefore used to calculate emission reductions. *Justification of evidences:* During the site visit, verification team checked the meters and its security. It was also verified the ENERSUL's memoranda and invoices to cross check the values.	OK	OK

Checklist Item (incl. guidance for the verification team)	**Reference**	**Verification Team Comments** (Means and results of assessment)	**Draft Concl.**	**Final Concl.**
		Conclusion: The danger of unintended or intended data manipulation can be considered as low.		

ANNEX 2: APPOINTMENT / AUTHORISATION STATEMENTS

TÜV NORD Certification

TÜV NORD CERT GmbH · P.O. Box 10 32 61 · 45032 Essen · Germany

Mr. Rainer Winter

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Authorization for Technical Areas / Sectoral Scopes

Dear Mr. Winter,

According to the requirements as specified in the TÜV NORD JI/CDM CP directives and the proven technical experience you are authorized for technical areas / sectoral scopes as follows:

Sectoral Scope	Technical Area	Basis for authorization	Date of Authorization
1	G – Energy Industry	1998-2005: RWTÜV Anlagentechnik GmbH, RWTÜV Systems, TÜV NORD CERT GmbH (> 10 Emission Assessments in Industrial Plants, A1).	2010-02-09
1*	K – Fuel Switch	TÜV NORD JI/CDM CP WVC project activity: 05/003 09/214	2010-02-09
1*	S – Ren. Hydro	TÜV NORD JI/CDM CP WVC project activity: 07/028 08/127	2010-02-09
1*	T – Ren. Wind	TÜV NORD JI/CDM CP WVC project activity: 05/004 09/010	2010-02-09
1*	U – Ren. Biomass	TÜV NORD JI/CDM CP WVC project activity: 09/024 09/025	2010-02-09
1*	J – Distribution and Investment gap	TÜV NORD JI/CDM CP WVC project activity: 09/046 09/048	2010-02-09
4	B – Cement and mineral production	1998-2005: RWTÜV Anlagentechnik GmbH, RWTÜV Systems (20 Emission Assessments in cement production, A8).	2010-02-09
4, 9	O – Metal ferrous	1998-2001: RWTÜV Anlagentechnik GmbH (20 Emission Assessments in metal ferrous production, A13).	2010-02-09
4*	F – EE Industry	TÜV NORD JI/CDM CP WVC project activity: 09/003 09/143	2010-02-09
5	AF – Chemical Industry (other than N2O)	1998-2001: RWTÜV Anlagentechnik GmbH (> 10 Emission Assessments in chemical industry, A10).	2010-02-09
5*	Q – N2O	TÜV NORD JI/CDM CP WVC project activity: 09/005 09/437	2010-02-09
13	N – Waste Management	1998-2005: RWTÜV Anlagentechnik GmbH, RWTÜV Systems (Environmental Impact Assessments, Lecturer for RW TÜV Akademia, > 10 Emission Assessments, A18).	2010-02-09

* Extension of technical areas within sectoral scopes

Best regards,

Dipl.-Ing. Eric Krupp
Deputy of TÜV NORD JI/CDM Certification Program

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TÜV NORD Certification

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TÜV®

Our / Your Reference | Contact: E-Mail: rwinter@tuv-nord.de | Direct Dial: Phone: -3329, Fax: -2139 | Date: 26.07.2010

Authorization for Technical Areas / Sectoral Scopes

Dear Dr. Andrade,

According to the requirements as specified in the TÜV NORD JI/CDM CP directives and the proven technical experience you are authorized for technical areas / sectoral scopes as follows:

Sectoral Scope	Technical Area	Basis for authorization	Date of Authorization
1	G – Energy Industry	1970 – 1982: Furnas Centrais Elétricas S.A. – Angra I Nuclear Power Plant, Rio de Janeiro/Brazil, Head of Nuclear Fuel Division. 1963 – 1994: Brazilian Navy (in cooperation with Nuclear Engineering Directory of Furnas Centrais Elétricas S.A., Sao Paulo/Brazil, Technical Director of the Nuclear Submarine Program/COPESP. 1994 – 1998: Brazilian Nuclear Regulatory Comission (CNEN) – Institute of Nuclear and Energy Research (IPEN), Sao Paulo/Brazil, Technical Director of Nuclear Engineering Department.	2010-02-16
1*	U – Ren. Biomass	TÜV NORD JI/CDM CP WVC project activity: 09/011 09/121	2010-02-16
1*	S – Ren. Hydro	TÜV NORD JI/CDM CP WVC project activity: 09/011 09/012	2010-07-26
2	I – Distribution Heat	1963 – 1994: Brazilian Navy (in cooperation with Nuclear Engineering Directory of Furnas Centrais Elétricas S.A., Sao Paulo/Brazil, Technical Director of the Nuclear Submarine Program/COPESP. 1994 – 1998: Brazilian Nuclear Regulatory Comission (CNEN) – Institute of Nuclear and Energy Research (IPEN), Sao Paulo/Brazil, Technical Director of Nuclear Engineering Department.	2010-02-18
3	H – Distribution Power	1970 – 1982: Furnas Centrais Elétricas S.A. – Angra I Nuclear Power Plant, Rio de Janeiro/Brazil, Head of Nuclear Fuel Division. 1963 – 1994: Brazilian Navy (in cooperation with Nuclear Engineering Directory of Furnas Centrais Elétricas S.A., Sao Paulo/Brazil, Technical Director of the Nuclear Submarine Program/COPESP.	2010-02-18
5	AF – Chemical Industry (other than N2O, PFC)	1970 – 1982: Furnas Centrais Elétricas S.A. – Angra I Nuclear Power Plant, Rio de Janeiro/Brazil, Head of Nuclear Fuel Division. 1963 – 1994: Brazilian Navy (in cooperation with Nuclear Engineering Directory of Furnas Centrais Elétricas S.A., Sao Paulo/Brazil, Technical Director of the Nuclear Submarine Program/COPESP.	2010-02-18

* Extension of technical areas within sectoral scopes

Best regards,

Dipl.-Ing. Rainer Winter
Head of TÜV NORD JI/CDM Certification Program

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BIC (SWIFT-Code): DEUTDEDE
IBAN-Code: DE 36 3607 0050 0629 0080 00

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TÜV NORD

CERTIFICATE OF APPOINTMENT

Mr. Martin Saalmann

born on 1976-02-23

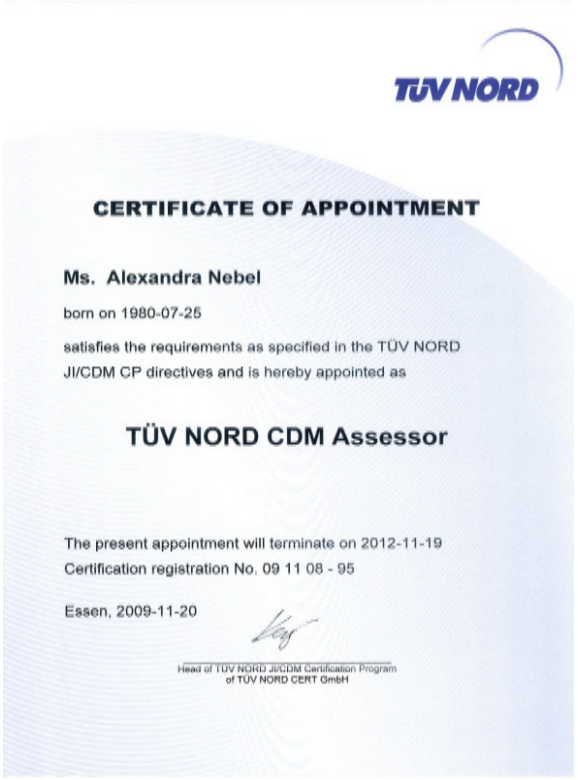
satisfies the requirements as specified in the TÜV NORD JI/CDM CP directives and is hereby appointed as

TÜV NORD JI/CDM Senior Assessor

The present appointment will terminate on 2013-03-31
Certification registration No. 10 04 01 – 22

Essen, 2010-04-01

Head of TÜV NORD JI/CDM Certification Program
of TÜV NORD CERT GmbH



TÜV NORD

CERTIFICATE OF APPOINTMENT

Ms. Alexandra Nebel

born on 1980-07-25

satisfies the requirements as specified in the TÜV NORD JI/CDM CP directives and is hereby appointed as

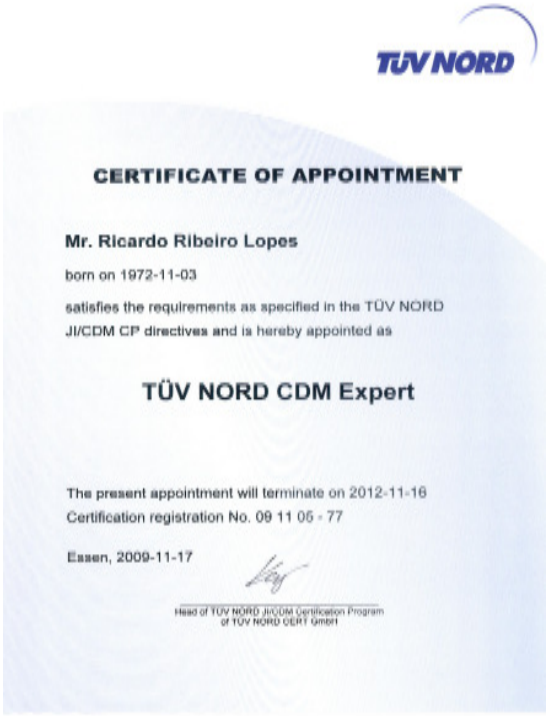
TÜV NORD CDM Assessor

The present appointment will terminate on 2012-11-19

Certification registration No. 09 11 08 - 95

Essen, 2009-11-20

Head of TÜV NORD JI/CDM Certification Program
of TÜV NORD CERT GmbH



TÜV NORD

CERTIFICATE OF APPOINTMENT

Mr. Ricardo Ribeiro Lopes

born on 1972-11-03

satisfies the requirements as specified in the TÜV NORD JI/CDM CP directives and is hereby appointed as

TÜV NORD CDM Expert

The present appointment will terminate on 2012-11-16

Certification registration No. 09 11 05 - 77

Essen, 2009-11-17

Head of TÜV NORD JI/CDM Certification Program
of TÜV NORD CERT GmbH