

VERIFICATION REPORT

4×50MW Dayingjiang-3 Hydropower Project Phases 1&2



Document Prepared By
Japan Consulting Institute

Project Title	4×50MW Dayingjiang-3 Hydropower Project Phases 1&2
Version	0
Report ID	JCI-VCS-VER-12/001

Report Title	Verification Report, 4×50MW Dayingjiang-3 Hydropower Project Phases 1&2
Client	Dehong Kairui Dayingjiang Hydropower Development Co., Ltd.
Pages	25
Date of Issue	18-03-2013
Prepared By	CDM Center, Japan Consulting Institute
Contact	Address; Sumitomo Fudosan Kudanshita Bldg. 3F, Kanda Jinbochou 3-5, Chiyoda-ku, Tokyo, Japan, 1010051 Telephone; 03-3222-8100 Email; cdm@jci-plant.or.jp Website; http://www.jci-plant.or.jp/
Approved By	(Approved by) Akio Yoshida, Executive Director, JCI CDM Center (Checked by) Hideyuki Sato, Evaluation Group Manager, JCI CDM Center
Work Carried Out By	Takayuki ABE, Verification Team Leader, JCI CDM Center

Summary:

Japan Consulting Institute (JCI) has performed the verification of the project “4×50MW Dayingjiang-3 Hydropower Project Phases 1&2”, with regard to the relevant requirements of VCS Program. This verification covers the period from 1st April, 2006 to 31st December, 2011.

It is JCI's responsibility to express an independent verification statement on both the reported GHG emissions and the GHG emission reductions from the project activity for the period.

JCI's verification is based on the requirements as defined under the VCS Program Guide and VCS Standard, as well as the related VCS Guidance including the Validation and Verification Manual.

The verification was performed based on the following documentation:

- 1) Registered PD dated 09/10/2009 /1/.
- 2) Approved methodology ACM0002 (ver.10), “*Consolidated methodology for grid-connected electricity generation from renewable sources*” /11/.
- 3) Tool to calculate the emission factor for an electricity system, version 01.1 /14/
- 4) Monitoring Report version 01.1 dated 31/05/2012 /4/ and version 03.1 dated 13/03/2013 /5/

The verification process covered the auditing techniques to assess the quality of the information including desk review and on-site assessment, and also the quality confirmation of evidence in accordance with the Validation and Verification Manual of VCS version 3.0 /18/.

JCI has verified that the information provided by the Project Proponent was actual and representative of current operation of the project activity, that it has been in accordance with the Monitoring Plan in the registered PD /1/ and the applied Methodology /11/, and that the emissions reduction achieved have been correctly determined.

In summary, it is JCI's opinion as the Validation/Verification Body that the information, described in the Monitoring Report version 03.1/5/, meets all relevant VCS rules and requirements of the VCS Program and all relevant host country criteria. And also, based on the information confirmed and verified by JCI, it is JCI's opinion that 3,614,268 tonnes of CO₂ equivalents, indicated in the Monitoring Report version 03.1 /5/, is correctly determined as the Emission Reductions in accordance with the VCS Program during the period from 01st April 2006 to 31st December 2011. JCI thus requests the issuance of the Verified Carbon Units (VCUs).

Table of Contents

1. INTRODUCTION	4
1.1 Objective	4
1.2 Scope and Criteria	4
1.3 Level of assurance	5
1.4 Summary Description of the Project	5
2 VALIDATION PROCESS, FINDINGS AND CONCLUSION	6
2.1 Validation Process	6
2.2 Validation Findings	7
2.2.1 Gap Validation	7
2.2.2 Methodology Deviations	7
2.2.3 Project Description Deviations	7
2.2.4 New Project Activity Instances	10
2.3 Validation Conclusion	10
3 VERIFICATION PROCESS	10
3.1 Method and Criteria	10
3.2 Document Review	10
3.3 Interviews	13
3.4 Site Inspections	14
3.5 Resolution of Any Material Discrepancy	15
4 VERIFICATION FINDINGS	16
4.1 Project Implementation Status	16
4.2 Accuracy of GHG Emission Reduction or Removal Calculations	18
4.2.1 Monitoring equipment	18
4.2.2 Calibration of measuring instruments	18
4.2.3 Baseline emission	20
4.2.4 Project emission	22
4.2.5 Accuracy of Emission Reduction Calculation	22
4.3 Quality of Evidence to Determine GHG Emission Reductions or Removals	23
4.4 Management and Operational System	23
5 VERIFICATION CONCLUSION	24

1. INTRODUCTION

The Project Proponent, Dehong Kairui Dayingjiang Hydropower Development Co., Ltd. has commissioned JCI to perform the verification of the “4×50MW Dayingjiang-3 Hydropower Project Phases 1&2” (hereafter called “the project”) for the monitoring period from 1st April, 2006 to 31st December 2011. This report summarizes the findings of the verification of the project, performed on the basis of all rules and requirements set out under VCS Program, Methodology and the related rules of UNFCCC.

1.1 Objective

Verification was conducted once the project implementation has commenced. It was the ex-post assessment of the monitored GHG data and information. During verification, JCI as Validation and Verification Body (VVB) evaluated the Monitoring Report and assess the following in accordance with Validation and Verification Manual of VCS Program /18/:

- The extent to which methods and procedures, including monitoring procedures, have been implemented in accordance with the validated Project Description (PD). This includes ensuring conformance with the monitoring plan.
- The extent to which GHG emission reductions and removals reported in the monitoring report are materially accurate.

1.2 Scope and Criteria

The scope of a verification helps place physical and temporal boundaries on the GHG data and information that must be assessed. Criteria are the set of requirements against which the project is evaluated.

In determining the scope of the assessment, JCI takes into account the physical boundaries, sites or facilities of the project and the temporal boundaries (ie, the years when GHG emission reductions and removals are quantified). For verification, the temporal boundaries are determined by the length of the monitoring period.

The mandatory requirements of the VCS Program and ISO 14064-2 guide the criteria against which the verification is conducted. The methodology applied to the project also informs the criteria for verification; JCI thoroughly understands a methodology prior to undertaking an assessment. Where projects apply methodologies from CDM, JCI shall refer to any guidance provided by CDM with regard to the application of the methodology.

VVB is not expected to document every criterion that will apply to the verification engagement. Instead, it is sufficient to indicate the relevant documents containing the criteria such as the VCS Standard, ISO 14064-2 and the applied GHG methodology.

JCI's verification is based on the requirements as defined under the VCS Program Guide /15/ and VCS Standard /16/, as well as the related VCS Guidance including the Validation and Verification Manual /18/.

- 1) JCI shall assess and verify that the implementation of the project activity and the steps taken to report emission reductions comply with the requirements as defined under the VCS Program Guide /15/ and VCS Standard /16/ and the relevant guidance provided by the VCS Association (VCSA).
- 2) This assessment shall involve a review of relevant documentation as well as on site visit in accordance with paragraph 3.3 of the Validation and Verification Manual /18/ of VCS Program. The information to be verified is described below.
- 3) The JCI's verification of the project documentation provided by the Project proponent shall be based upon both quantitative and qualitative information on emission reductions.

Quantitative information comprises the reported numbers in the monitoring report submitted to JCI. Qualitative information comprises information on internal management controls, calculation procedures, procedure for transfer of data, frequency of emissions reports and review and internal audit of calculations.

- 4) In addition to the monitoring documentation provided by the Project proponents, JCI reviews :
 - (a) The registered VCS PD /1/ including the monitoring plan and the corresponding validation report /2/;
 - (b) The applied monitoring methodology;
 - (c) VCS Program Guide /15/, VCS Standard /16/ and Relevant VCS Guidance;
 - (d) Relevant decisions, clarifications and guidance of CDM;
 - (e) Any other information and references relevant to the project activity's resulting emission reductions (e.g., IPCC reports, data on electricity generation in the national grid or laboratory analysis and national regulations).

1.3 Level of assurance

The VCS Program requires a reasonable level of assurance in verification that GHG assertions are free of material errors, omissions and misrepresentations. This is non-negotiable between the project proponent and the VVB. In a reasonable level of assurance engagement, the JCI tests a sufficient amount of data to ensure with confidence that no material errors are present.

JCI conducts a verification of the project and summarises the verification results in the Verification Report which is based on the VCS Project Description (PD), the VCS Monitoring Report (MR), the supporting evidences which are available to the verifier, and the information collected through interview with the project proponent and site visit. JCI planned and organized to achieve a reasonable level of assurance of the verification conclusion.

1.4 Summary Description of the Project

4×50MW Dayingjiang-3 Hydropower Project Phases 1&2 (hereafter referred to as the project) is consists of four 50MW, in total 200MW capacity of hydropower generation units developed at Yingjiang County, Dehong Prefecture, Yunnan Province, P. R. China. The objective of the project is to utilize water resources of the Daying River for electricity generation, which was registered on 24th November, 2009 by the VCS board. The project is a grid-connected renewable energy project, from which the electricity generated is sold to the Dehong Power Grid and then fed to Yunnan Power Grid, an integral part of the China Southern Power Grid (hereafter referred to as CSPG). The project activity contributes to the obvious GHG emission reductions by avoiding CO₂ emissions, as CSPG is dominated with fossil fuel fired power plants.

The monitoring period of this time is from 1st April, 2006 to 31st December, 2011. The total electricity replaced by the project during this monitoring period was 4,148,645.39MWh; therefore the emission reduction is 3,614,268 tCO₂e throughout the monitoring period.

The PD has applied the following methodology and Tools of CDM to the project activity;

- 1) Methodology of ACM0002 "Consolidated methodology for grid-connected electricity generation from renewable sources" (ver.10) /11/,
- 2) Tool for the demonstration and assessment of additionality (ver.05.2) /12/,
- 3) Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion (ver.02) /13/,

4) Tool to calculate the emission factor for an electricity system (ver.01.1) /14/

Table 1 Protocol (CL-1)

No. of request	CL-1
Clarification request	MR 1.8. Title and Reference of Methodology The version number of each Tool shall be shown in the Monitoring Report.
Reference	
Summary of project owner response	The version number of each Tool is added.
Verification team conclusion	The Monitoring Report has revised appropriately. CL-1 was resolved and closed.

2 VALIDATION PROCESS, FINDINGS AND CONCLUSION

2.1 Validation Process

JCI shall apply standard auditing techniques to assess the quality of the information, including but not limited to:

(a) Desk review, involving:

- (i) A review of the data and information presented to verify their completeness;
- (ii) A review of the monitoring plan and monitoring methodology, paying particular attention to the frequency of measurements, the quality of metering equipment including calibration requirements, and the quality assurance and quality control procedures;
- (iii) An evaluation of data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions.

The documentations reviewed during the validation are same as the list in 3.2 Document Review.

(b) On-site assessment, involving:

- (i) An assessment of the implementation and operation of the proposed VCS project activity as per the registered PD and the Monitoring Plan;
- (ii) A review of information flows for generating, aggregating and reporting the monitoring parameters;
- (iii) Interviews with relevant personnel to confirm that the operational and data collection procedures are implemented in accordance with the revised monitoring plan;
- (iv) A cross-check between information provided in the monitoring report and data from other sources such as plant log books, inventories, purchase records or similar data sources;
- (v) A check of the monitoring equipment including calibration performance and observations of monitoring practices against the requirements of the PD and the selected methodology;
- (vi) A review of calculations and assumptions made in determining the GHG data and emission reductions;
- (vii) An identification of quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.

The on-site visit and interview with stakeholders conducted for the validation are same as the list in 3.3 Interviews.

2.2 Validation Findings

2.2.1 Gap Validation

The project is only applied to and registered with the VSC Program and not to the CDM project and another approved GHG Program. JCI has confirmed it by desk review of the project documents and interview with the project proponent. So a gap validation is not required on the project.

2.2.2 Methodology Deviations

There is not any methodology deviation applied to the project. JCI has confirmed it by desk review of the project documents and information, interview with the project proponent and on site visit.

2.2.3 Project Description Deviations

There is one deviation in the monitoring plan from the registered PD on 24th November, 2009 /1/.

Originally M2 and M4 meters which are described as the backup meters for this project are actually possible to be used as the backup meters. However, both the meters are confirmed to be used for measuring the reactive power, not the active power at each point. Therefore the actual electric power supplied from this project is measured by M3 and M5 and, when there is some trouble on M3 and M5 meters, the emission reduction is calculated based on the invoice data measured by the grid company. The detail of this change can be referred to the section 3.3 Description of the monitoring report.

VCS Validation and Verification Manual /18/ stipulates as follows regarding the project description deviation;

- Where the deviation impacts applicability of the methodology, additionality or appropriateness of the baseline scenario, the project proponent must describe and justify the deviation in a revised version of the project description. The requirement for a revised project description is in recognition of the deviation being a substantial change to the project.
- Where the deviation does not impact the applicability of the methodology, additionality or the appropriateness of the baseline scenario, and the project remains in compliance with the applied methodology, the project proponent must describe and justify the deviation in the monitoring report. The deviation is documented in the monitoring report in recognition of the deviation being a more limited change to the project.

In case of the deviation of the project, it is a deletion of backup meter from the monitoring plan. The deviation impacts only on accuracy of monitoring results but the power sale invoice base on measurement of the grid company can be used for crosscheck of main meter measurement and also for calculation of emission reduction when the main meter is failed.

The project proponent has described and justified the deviation in the monitoring report /5/ that it does not impact the applicability of the methodology, additionality or the appropriateness of the baseline scenario, and the project remains in compliance with the applied methodology.

JCI concluded that the deviation was acceptable in accordance with the VCS requirement since it was in compliance with the applied methodology. And also JCI confirmed that the project proponent described and justified the deviation in the monitoring report appropriately. JCI concluded that the deviation was documented in the monitoring report appropriately in recognition of the deviation being a more limited change to the project.

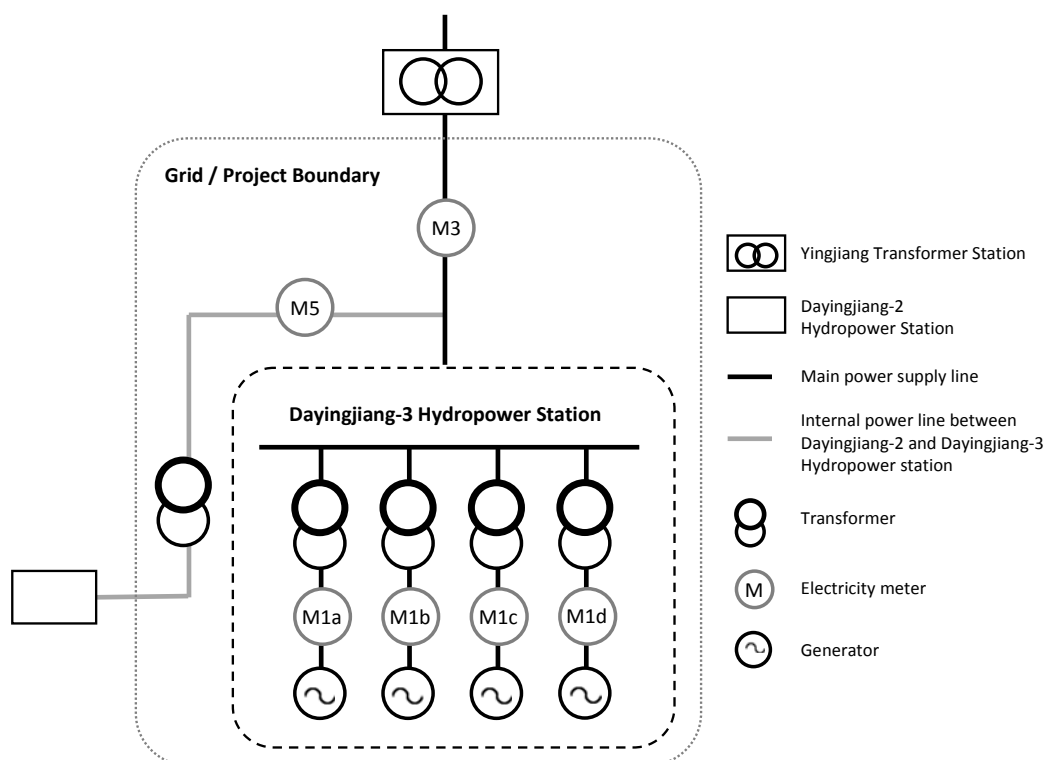


Figure 1 Revised Monitoring System

Table 2 Protocol (CL-2)

No. of request	CL-2
Clarification request	MR 2.2. Deviations from the Monitoring Plan The Monitoring Report reports that "there is no deviation". But it has been confirmed during the on-site assessment that some monitoring devices were not installed as M2 and M4 of the Monitoring Plan.
Reference	
Summary of project owner response	Based on the actual monitoring activity, the relevant description in the Monitoring Report is revised to delete some monitoring devices: M2 and M4 backup meters, since the monitoring activity is conducted with the main meters M3 and M5 at the same time, the M2 and M4 meters are used for other way that measuring reactive power.
Verification team conclusion	The explanations of deletion of M2 & M4 have added in the Monitoring Report appropriately. CL-2 was resolved and closed.

Table 3 Protocol (CL-3)

No. of request	CL-3
Clarification request	MR 3.3. Description of the Monitoring Plan As same as CL-2, Figure 1 does not show the actual configuration due to change of the monitoring devices.
Reference	
Summary of project owner response	The description of M2 and M4 in the Figure 1 is deleted.
Verification team conclusion	Figure 1 has been revised appropriately to show the actual configuration of monitoring devices. CL-3 was resolved and closed.

Table 4 Protocol (CL-4)

No. of request	CL-4
Clarification request	MR 3.3 Description of the Monitoring Plan The Monitoring Report reports that "Project entity" manages the electricity meter M4. What is the "Project entity"?
Reference	
Summary of project owner response	The relevant statement has been deleted since it is mentioned to conduct to record the data of M4 which has been cancelled to use as the backup meter. At the same time, the statement about the M2 which is also cancelled because of the same reason is deleted simultaneously.
Verification team conclusion	The statements regarding M2 & M4 have been deleted due to the reason of CL-2 & 3. CL-4 was resolved and closed.

Table 5 Protocol (CL-5)

No. of request	CL-5
Clarification request	MR 3.3 Description of the Monitoring Plan It is shown that, if main meter do not work, the backup electricity meters M2 and M4 will be used. But JCI confirmed during on-site assessment that there was no backup electricity meters. When the main meters are It should be revised.
Reference	
Summary of project owner response	The relevant statement that M2 and M4 meters are used when M3 and M5 meters do not work is deleted. When some trouble happened on the M3 and M5 meters, the data on the invoice will be used for calculation of the emission reduction.
Verification team conclusion	The Monitoring Report has revised appropriately. CL-5 was resolved and closed.

2.2.4 New Project Activity Instances

In the registered VSC PD /1/ the project is defined as a grouped project. During the monitoring period between 1st April 2006 and 31st December 2011 there was not any project inclusion to the project. So validation is not required regarding new project activity instance.

2.3 Validation Conclusion

JCI concluded that gap analysis was not required since there was not any methodology deviation and also was not the project description deviation to impact on applicability of methodology, and also there was not any project inclusion as new project activity instance.

3 VERIFICATION PROCESS

3.1 Method and Criteria

JCI shall apply standard auditing techniques to assess the quality of the information including but not limited to:

- (a) Desk review, involving:
 - (i) A review of the data and information presented to verify their completeness;
 - (ii) A review of the monitoring plan and monitoring methodology, paying particular attention to the frequency of measurements, the quality of metering equipment including calibration requirements, and the quality assurance and quality control procedures;
 - (iii) An evaluation of data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions.
- (b) On-site assessment, involving:
 - (i) An assessment of the implementation and operation of the proposed VCS project activity as per the registered PD and the Monitoring Plan;
 - (ii) A review of information flows for generating, aggregating and reporting the monitoring parameters;
 - (iii) Interviews with relevant personnel to confirm that the operational and data collection procedures are implemented in accordance with the revised monitoring plan;
 - (iv) A cross-check between information provided in the monitoring report and data from other sources such as plant log books, inventories, purchase records or similar data sources;
 - (v) A check of the monitoring equipment including calibration performance and observations of monitoring practices against the requirements of the PD and the selected methodology;
 - (vi) A review of calculations and assumptions made in determining the GHG data and emission reductions;
 - (vii) An identification of quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.

3.2 Document Review

The following table outlines the documentation reviewed during the verification:

Table 6 Document list

No.	Title
PDD, Methodology, Tools, Guidance, Guidelines, and Manual	
/1/	Registered PD of “4×50 MW Dayingjiang-3 Hydropower Project Phases 1&2” (Version 1.3), dated 09/10/2009
/2/	Validation Report of “4×50 MW Dayingjiang-3 Hydropower Project Phases 1&2”, dated 15/10/2009, by JCI
/3/	Summary of On-site Assessment, dated 21/09/2012
/4/	Monitoring Report “4×50 MW Dayingjiang-3 Hydropower Project Phases 1&2” for 1st monitoring period (Version 01.1), dated 31/05/2012
/5/	Monitoring Report “4×50 MW Dayingjiang-3 Hydropower Project Phases 1&2” for 1st monitoring period (Version 03.1), dated 13/03/2013
/6/	Emission Reduction Calculation Sheet Dayingjiang-3, by Tepia Japan
Methodology, Tools, Guidance, Guidelines, and Manual	
/11/	ACM0002 “Consolidated baseline methodology for grid connected electricity generation from renewable sources” (Version 10)
/12/	Tool to demonstrating and assessment of additionality (Version 05.2)
/13/	Tool to calculate project or leakage CO2 emissions from fossil fuel combustion (Version 02)
/14/	Tool to calculate the emission factor for an electricity system (Version 01.1)
/15/	VCS Program Guide (Version 3.4), VCSA, 04/10/2012
/16/	VCS Standard (Version 3.3), VCSA, 04/10/2012
/17/	VCS Registration and Issuance process (Version 3.4), VCSA, 04/10/2012
/18/	VCS Validation and Verification manual (Version 3.0), VCSA, 04/10/2012
/19/	VCS Monitoring Report Template (Version 3.2), VCSA, 04/10/2012
/20/	VCS Verification Report Template (Version 3.2), VCSA, 04/10/2012
/21/	CDM Project Standard (version 02.1), CDM-EB

No.	Title
/22/	CDM Validation and Verification Standard (version 03.0), CDM-EB
/23/	VCS verification deed of representation by JCI, 18/03/2013
Monitoring data & CER calculation	
/31/	Electricity invoice, Jan. 2012
/32a/	Monthly electricity supply, 2006 (Apr – Dec), by DKDHDC
/32b/	Monthly electricity supply, 2007, by DKDHDC
/32c/	Monthly electricity supply, 2008, by DKDHDC
/32d/	Monthly electricity supply, 2009, by DKDHDC
/32e/	Monthly electricity supply, 2010, by DKDHDC
/32f/	Monthly electricity supply, 2011, by DKDHDC
/32g/	Monthly electricity supply, 2012, by DKDHDC
/33/	Measurement result of the surface area of the reservoir, 10/08/2012, by Kunming Investigation, Design & Research Institute
/34a/	Daily river water flow data, 2009 (May – Dec)
/34b/	Daily river water flow data, 2010
/34c/	Daily river water flow data, 2011
/35a/	Calibration report – M 3 meter (SN 2516279), 22/ 02/2006
/35b/	Calibration report – M 2 meter (SN 2516278), 22/ 02/2006
/35c/	Calibration report – M 5 meter (SN 2516280), 22/ 02/2006
/35d/	Calibration report – M 4 meter (SN 2516283), 22/ 02/2006
/36a/	Testing Reports on Electric meter, 02/09/2006
/36b/	Testing Reports on Electric meter, 25/03/2008
/36c/	Testing Reports on Electric meter, 21/08/2008
/36d/	Testing Reports on Electric meter, 11/09/2009

No.	Title
/36e/	Testing Reports on Electric meter, 27/09/2010
/36f/	Testing Reports on Electric meter, 25/02/2010
/36g/	Testing Reports on Electric meter, 07/07/2011
/36h/	Testing Reports on Electric meter, 09/11/2011
/37/	Spread sheet for Monthly Invoice data (2006 – 2011)
Others	
/41/	VCS Monitoring Management Manual
/42/	Operator training manual / training data
/43/	Power Connection Agreement 2012, Feb. 2012, between Yunnan Grid Company
/44/	Power Purchase Agreement 2012, Feb. 2012, between Yunnan Grid Company
/45/	News on the drought in Yunnan Province, 17/02/2012

3.3 Interviews

The verification team visited the Project site on 20 to 21 September 2012 to verify whether the project has been implemented, monitored and reported as planned. During the visit, the team interviewed with relevant stakeholders listed in the below table with the topics discussed /3/.

Table 7 List of interviewees during on-site assessment

No.	Date	Name	Organization	Topics
/50/	20/09/2012	Mr. Yi Yinggui Ms. Wang Qiuxian Mr. Yin Yizhi Mr. Li Ruijan Mr. Zhao Jin Ms. Wang Nan Ms. Keiko Tsuji Mr. Wang Shaohai	DKDHDC KIDRI Tepia Japan Sun Valley	<u>Site visit & Interview with Project Owner</u> • Confirmation of plant facilities and monitoring system • Project implementation status

No.	Date	Name	Organization	Topics
/51/	20-21 /09/2012	Mr. Yi Yinggui Ms. Wang Qiuxian Mr. Yin Yizhi Mr. Li Ruijan Mr. Zhao Jin Ms. Wang Nan Ms. Keiko Tsuji Mr. Wang Shaohai	DKDHDC KIDRI Tepia Japan Sun Valley	<u>Interview with Project Owner</u> • Organization for monitoring, data handling, ER calculation and QA system • Calibration of monitoring devices • Evidence related to the monitoring <u>Review of 1st Periodic monitoring data</u> • Monitoring data • Calibration results of monitoring devices • ER calculation method <u>Interview with Tepia Japan</u> • Monitoring report • Calculation procedure of ER
/52/	21/09/2012	Mr. Yi Yinggui Ms. Wang Qiuxian Mr. Yin Yizhi Mr. Li Ruijan Mr. Zhao Jin Ms. Wang Nan Ms. Keiko Tsuji Mr. Wang Shaohai	DKDHDC KIDRI Tepia Japan Sun Valley	<u>Interview with Project Owner, Tepia Japan</u> • Confirmation of evidence • Summary of on-site assessment

DKDHDC ; Dehong Kairui Dayingjiang Hydropower Development Co., Ltd.
KIDRI ; Kunming Investigation, Design & Research Institute
Tepia Japan ; Tepia Corporation Japan Co., Ltd.
Sun Valley ; Yunnan Sun Valley Energy Conservation Industry Development Co., Ltd.

3.4 Site Inspections

The assessment team has conducted site inspection on 20/09/2012 and interviews with the project proponent to cross check the compliance of the project activity along with the project description document. The related documents of the project activity had been assessed to confirm the actual situation during the site visit.

The results of the site inspection are as follows;

- 1) It was confirmed by the name plates that the model of Turbine / Generator was consistent with the registered Project Description.

- 2) It was confirmed that the monitoring equipment have been maintained in consistence with the registered Monitoring Plan.
- 3) The data of main meter was sent automatically to the Grid Company at specified time of every month.
- 4) The assessment team conducted the interview with the operator on training operation and VCS.

3.5 Resolution of Any Material Discrepancy

JCI, during its verification, shall identify issues related to the monitoring, implementation or operations of the proposed VCS project activity that could impair the capacity of the proposed VCS project activity to achieve emission reductions or influence the reporting of emission reductions. JCI shall identify, discuss and conclude these issues in the verification report.

JCI shall raise a CAR if one of the following occurs:

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

JCI shall raise a clarification request (CL) if information is insufficient or not clear enough to determine whether the applicable VCS requirements have been met.

JCI shall raise a FAR during verification for actions if the monitoring and reporting require attention and/or adjustment for the next verification period.

All CARs and CLs raised by the VVB during verification shall be resolved prior to submitting a request for issuance.

JCI shall report on all CARs, CLs and FARs in this verification report. This reporting shall be undertaken in a transparent manner that allows the reader to understand the nature of the issue raised the nature of the responses provided by the Project proponents, the means of verification of such responses and clear references to any resulting changes in the monitoring report or supporting annexes.

JCI shall resolve or “close out” CARs and CLs only if the Project proponents modify the monitoring report or provide adequate additional explanations or evidence that satisfies the JCI’s concerns. If this is not done, JCI shall not recommend the project activity for VCUs issuance to the VCSA.

The verification protocol consists of the following description.

- ✧ Ref. to question in Protocol :
Reference to the checklist question number in Protocol where the **CAR, CL or FAR** is explained.
- ✧ Summary of project owner response :
The responses given by the project proponents during the communications with the verification team should be summarised in this section.
- ✧ Verification conclusion :

This section should summarise the verification team's responses and final conclusions.

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

The project was registered on 24th November, 2009 according to the information on the Project pipeline of the VCS website. The 1st crediting period of the project is from 01/04/2006 to 31/03/2016. The Validation Report of the project /2/ showed that all of CARs and CLs were closed in the Protocol.

The project is a 200 MW hydropower station located at the lower reach of the Daying River in the Yingjiang County, Dehong Prefecture, Yunnan Province, P. R. China. The installed capacity of the project is total 200 MW (50 MW x 4 units) with the expected annual grid supply electricity of 725,460 MWh (after 2009, and 354,914 MWh for 2006, 308,896 for 2007, and 700,183 for 2008, respectively).

The phase 1 of the project started the construction on August 2003 and completed on 31/07/2006. The commissioning started on 18/03/2006. The phase 2 of the project started the construction on May 2006 and completed on 13/05/2008. The commissioning started on 04/05/2008. The monitoring of the VCS project started on 01/08/2006 including the phase 1 and 2. The 1st monitoring period was from 01/04/2006 to 31/12/2011.

During on-site assessment for the Monitoring Report JCI confirmed that all physical features of the project described in the registered PD and the Monitoring Plan /1/ were in place, and the actual implementation of the project was in accordance with the registered PD, the PD including the Monitoring Plan /1/ and the methodology applied /11/.

The Monitoring Reports /4//5/ covers the monitoring period when it is from 01/04/2006 to 31/12/2011. During the monitoring period, the actual operation load factors of the plant (= Electricity exported to the grid* / Capacity / Days / 24hrs x100) are as follows;

* Electricity exported to the grid = EG_{ex} (M3-M5) in the Monitoring Report

Table 8 Plant Load Factor

Period	Electricity exported (MWh)	Plant Capacity (MW)	Load Factor (%)
01/04/2006~31/12/2006	347,260.10	100	52.6
01/01/2007~31/12/2007	309,442.99	100 (in Jan) 200 (after Feb)	19.2
01/01/2008~31/12/2008	700,183.44	200	40.0
01/01/2009~31/12/2009	855,356.52	200	48.8
01/01/2010~31/12/2010	938,632.82	200	53.6
01/01/2011~31/12/2011	997,776.56	200	57.0
Total	4,148,652.43	-	44.9

In the monitoring period from 01/04/2006 to 31/12/2011, the average load factor is 44.9 % and the operation of the plant is relatively stable over the period. The average load factor is almost same value as 41.4 % (=725,460MWh / 200MW / 8760hour) of expected in the Validation Report /2/. JCI confirmed regarding the reason of low load factor in 2007 that there was some operation/maintenance trouble and then the operation company has been changed to the present company. And also JCI confirmed regarding the reason of high load factor of years 2009 to 2011 that, in those years, the rainfall in the relevant area was almost same as usual year /34/ in spite of the low rainfall in the other area of Yunnan Province /45/. Therefore the project could produce at high load factor more than expected.

From above JCI concluded that such load factors reported in Table 8 are reasonable.

Table 9 Emission reductions

Item	Values applied in ex-ante calculation of the registered PD	Actual values reached during the monitoring period
Total Emission reductions (tCO ₂ e)	3,008,132	3,614,268
Yearly Emission reductions *1 (tCO ₂ e)	632,021	810,722

*1; Average Value for year 2009, 2010 and 2011 while being fully available for 200MW

JCI confirmed that all of information, which was provided in the monitoring report including monitored data and used variables, were reasonable and consistent with those in the registered PD.

Table 10 Protocol (CL-6)

No. of request	CL-6
Clarification request	MP 4.1. Baseline Emissions It is reported that there is no EGy and BEy in September to November 2007. Its reason shall be clarified.
Reference	
Summary of project owner response	There was no power generation at the project site during September to November 2007. It was because there was a human error trouble brought about by the outsourcing operating company, so that the project owner stopped the operation and changed the operating company during the period. In addition, the power station has been supplied a little amount of electric power from the grid company, thus this part of emission is deducted from the baseline emission.
Verification team conclusion	The reason of no power generation in September to November 2007 was clarified and it was added as foot note No. 2 in the Monitoring Report. CL-6 was resolved and closed.

4.2 Accuracy of GHG Emission Reduction or Removal Calculations

4.2.1 Monitoring equipment

As per the revised PD including the Monitoring Plan, the following monitoring equipments were installed in the proposed project plant.

Table 11 Monitoring Equipments

Item	Meter	Role	Place installed	Type	SN ^{*2}	Accuracy
EG _{export,y} (M3)	M3	Electricity export from Project to Grid	Outlet of Project 220 kV line	MK3 ^{*1}	2516279	0.2S
EG _{import,y} (M3)		Electricity import from Grid to Project				
EG _{export,y} (M5)	M5	Electricity export from Dayingjiang-2 to Project	Inlet of Project 220 kV line	MK3 ^{*1}	2516280	0.2S
EG _{import,y} (M5)		Electricity import from Project to Dayingjiang-2				

*1; Bidirectional type meter *2; Serial Number

The project has two transmission lines connected with other facilities which are the Grid and the Dayingjiang-2 Hydropower Station. The electricity generated in the Dayingjiang-2 Hydropower Station is transmitted to the project and is combined with the electricity generated in the project, and then the combined electricity is transmitted to the Grid (Dehong Power Grid).

There are two main meters which are shown in the Table 3. Those monitoring equipments are in consistence with the Monitoring Plan /1/ including accuracy level. There is not any back up meter for measurement of electricity export/import in the project site, but it can be backed up by the invoice issued by the Grid Company when the main meter is troubled or faulted.

JCI confirmed during on-site assessment that these meters were placed as specified in the revised PD including the Monitoring Plan /1/ and also in the Monitoring Report from 01/04/2006 to 31/12/2011 /5/.

The installed capacity (Cap_{PJ}) as monitoring item is confirmed as total 200 MW by on-site observation of the name plates of installed Turbine/Generator /3/.

The area of the reservoir (A_{pi}) as monitoring item is confirmed as 0.108 m² by the evidence measured by the design institute which is same as the value in the registered PD /33/.

4.2.2 Calibration of measuring instruments

The PD including Monitoring Plan /1/ showed that measurement by electric meters was done according to the relevant national electric industry standard and regulations. It is interpreted that calibration of the project's electric meter shall be followed to those standard and regulations.

The project's meters which should be calibrated are M3 and M5 measuring of EG_{export,y} and EG_{import,y} between the project and the Grid and also between Dayingjiang-2 Hydropower Station

and the project. The calibrations were based upon the codes of "Technical administrative code of electric energy metering" (DL/T448-2000) and "Calibration device for electric energy metering" (SD109-1983) in order to ensure the accuracy of the meters.

The Project proponent submitted the calibration records of all monitoring equipments /35a//35c/ and /36a/-/36h/ and the results were summarized as follows. All of meters used for monitoring were checked its accuracy by Yunnan Electric Power Test & Research Institute Group Co., Ltd. The calibrations were carried out before the start of commissioning and then yearly during the monitoring period at the site installed.

The calibration records showed that all of the main meters in the project have been calibrated as per requirements of the relevant national standards. The accuracy classes of meters for M3 of EG_{export,y} and M5 of EG_{import,y} are confirmed appropriately as 0.2S.

Table 12 Calibration results^{*1}

No.	Item	SN	Accuracy Class	Date of Calibration	Result	On-line Period
M3	EG _{export,y} EG _{import,y} between Project & Grid	2516279	0.2S	21/02/2006	Pass	01/04/2006 - 31/12/2011
				02/09/2006	Pass	
				25/03/2008	Pass	
				21/08/2008	Pass	
				11/09/2009	Pass	
				27/09/2010	Pass	
				25/02/2010	Pass	
				07/07/2011	Pass	
				09/11/2011	Pass	
M5	EG _{export,y} EG _{import,y} between Dayingjiang-2 & Project	2516280	0.2S	21/02/2006	Pass	01/04/2006 - 31/12/2011
				02/09/2006	Pass	
				25/03/2008	Pass	
				21/08/2008	Pass	
				11/09/2009	Pass	
				27/09/2010	Pass	
				25/02/2010	Pass	
				07/07/2011	Pass	
				09/11/2011	Pass	

*1; Calibrated by Yunnan Electric Power Test & Research Institute Group Co., Ltd

JCI verified the calibration certificate for the meters issued by Yunnan Electric Power Test & Research Institute Group Co., Ltd. JCI concluded that all of the meters have been maintained

properly and those accuracies have been within specified accuracy levels during the monitoring period from 01/04/2006 to 31/12/2011.

4.2.3 Baseline emission

The registered PD /1/ stated the baseline emission BE_y was calculated as follows in accordance with the applied methodology ACM0002 (Version 10) /11/ and "Tool to calculate the emission factor for an electricity system" (Version 01.1) /14/.

$$BE_y = EG_y \times EF_{grid,CM,y}$$

$$= (EG_{export,y} - EG_{import,y}) \times EF_{grid,CM,y}$$

Where:

BE_y = Baseline emissions in year y (tCO_2/yr)

EG_y = Electricity supplied by the project activity to Grid (MWh).

$EF_{grid,CM,y}$ = Combined margin CO_2 emission factor for grid connected power generation in year y , which is calculated by the latest version of the "Tool to calculate the emission factor for an electricity system". The PD selected "Ex ante option" for emission factor determination and then the value of $EF_{grid,CM,y}$ was $0.8712 tCO_2/MWh$ from the PD.

$EG_{export,y}$ = Electricity supplied by the project activity to the grid (MWh)
 $EG_{export,y}$ is calculated from the measurements of M3 and M5 ($EG_{export,y} = M3_{ex} - M5_{ex}$). $M3_{ex}$ is the electricity supplied by the project and Dayingjiang-2 Hydropower Project to the Grid through the main power line and $M5_{ex}$ is the electricity supplied by Dayingjiang-2 Hydropower Project to the project through the main power line.

$EG_{import,y}$ = Electricity imported from the grid to the project (MWh)
 $EG_{import,y}$ is calculated from the measurements of M3 and M5 ($EG_{import,y} = M3_{im} - M5_{im}$). $M3_{im}$ is the electricity delivered to the project and Dayingjiang-2 Hydropower Project through the main power line from the Grid and $M5_{im}$ is the electricity delivered to Dayingjiang-2 Hydropower Project through the main power line from the project.
In case of the project activity $M5_{im}$ (electricity delivered to Dayingjiang-2 from the project) is excluded from BE_y calculation and then $EG_{import,y} = M3_{im}$. JCI concluded that the exclusion was conservative estimation for BE_y and also that it was acceptable.

Table 13 Baseline Emission Calculation

Year	$EG_{export,y}$			$EG_{import,y}$	EG_y	BE_y
	$M3_{ex}$	$M5_{ex}$	$M3_{ex} - M5_{ex}$	$M3_{im}$	$EG_{export,y} - EG_{import,y}$	
	MWh	MWh	MWh	MWh	MWh	
2006	347,260.10	0.00	347,260.10	0.00	347,260.10	302,529
2007	553,831.46	244,388.47	309,442.99	4.62	309,438.37	269,579

2008	968,197.56	268,014.12	700,183.44	1.32	700,182.12	609,993
2009	1,167,019.70	311,663.18	855,356.52	0.00	855,356.52	745,180
2010	1,264,748.76	326,115.94	938,632.82	0.88	938,631.94	817,729
2011	1,330,470.24	332,693.68	997,776.56	0.22	997,776.34	869,258
Total	5,631,527.82	1,482,875.39	4,148,652.43	7.04	4,148,645.39	3,614,268

Table 13 shows the yearly data of $EG_{\text{export},y}$, $EG_{\text{import},y}$, EG_y and BE_y . The total electricity supply from the project to Grid is 3,614,268 tCO₂e for the monitoring period from 01/04/2006 to 31/12/2011.

JCI checked the monthly electricity exported to the Grid ($EG_{\text{export},y}$, $M3_{\text{ex}}$ and $M5_{\text{ex}}$) and the monthly electricity imported from the Grid ($EG_{\text{import},y}$ and $M3_{\text{im}}$) reported respectively in Table 1 of the Monitoring Report /5/. JCI concluded that the data of electricity meter reading and the sales receipt are consistent each other.

The baseline emission was calculated as follows;

$$\begin{aligned}
 BE_y &= EG_y \times EF_{\text{grid},\text{CM},y} \\
 &= (EG_{\text{export},y} - EG_{\text{import},y}) \times EF_{\text{grid},\text{CM},y} \\
 &= ((M3_{\text{ex}} - M5_{\text{ex}}) - M3_{\text{im}}) \times EF_{\text{grid},\text{CM},y} \\
 &= (4,148,652.43 - 7.04) \times 0.8712 \\
 &= 3,614,299 \text{ tCO}_2\text{e} \\
 &> 3,614,268 \text{ tCO}_2\text{e} \text{ (the value reported in the Monitoring Report)}
 \end{aligned}$$

The total emission reduction of 3,614,268 tCO₂e in the Monitoring Report /5/ was calculated such as summation of round down values of every month's emission reduction. It is smaller value than above calculation results of 3,614,299 tCO₂e. JCI concluded that 3,614,268 tCO₂e in the Monitoring Report /5/ was a conservative value and then it was acceptable.

JCI verified the data and parameter used for the baseline emission calculation during the monitoring period from 01/04/2006 to 31/12/2011 and concluded that all of those data and parameters were correct.

Table 14 Protocol (CL-7)

No. of request	CL-7
Clarification request	MR 4.1. Baseline Emissions In Table 1, EG_y shall be reported as kWh instead of MWh. And each year total shall be reported in the Table.
Reference	
Summary of project owner response	The description of EG_y is revised to include the decimal number in the unit MWh, since the unit of emission factor, EF_y , is written as "tCO ₂ e/MWh", therefore it is considered to be easier to calculate with the unit MWh.
Verification team conclusion	The Table 1 has revised appropriately. CL-7 was resolved and closed.

Table 15 Protocol (CL-8)

No. of request	CL-8
----------------	------

Clarification request	MR 4.1. Baseline Emissions The total BE _y of 2006 has reported as 302,533 tCO ₂ e. But the PD reported as 232,960tCO ₂ e. Its difference shall be clarified.
Reference	
Summary of project owner response	According to the power sales record in 2006 which covers from March to December (10 months), the actual amount of power sold was 354,914 MWh in that year. Then the actual amount of power sold from April to December (9 months) in 2006 was calculated as followings in the registered PD; 354,914 MWh * 275/365 days = 267,401 MWh The above formula is obviously incorrect because it has to be the aggregated amount of monthly power sold from April to December in 2006 recorded in the power sales record; therefore the amount is corrected as the aggregated value of the actual amount of power sold during the 9 months, i.e., 347,260 MWh. As a result, BE _y in 2006 is also corrected as 302,529 tCO ₂ e accordingly.
Verification team conclusion	It has been clarified appropriately. CL-8 was resolved and closed.

4.2.4 Project emission

The reservoir area of the project is 0.108 m² and the power density is 1851.9 W/m² in the registered PD /1/. The project proponent has submitted the evidence for the measured reservoir area at August 2012 which showed 0.108 m² as same as PD /33/. From the value the power density is calculated to be 1851.9 W/m² which is more than 10 W/m² of the threshold of project emission in ACM0002 /11/. Then according to the applied methodology (ver10) /11/, the project emission should be neglected.

$$PE_y = 0 \text{ tCO}_2\text{e.}$$

4.2.5 Accuracy of Emission Reduction Calculation

The spread sheet of ER calculation /6/ was submitted and verified by JCI. The calculation results were showed in Table 1, 2 & 3 in the Monitoring Report.

Total baseline emissions (BE_y) : 3,614,268 tCO₂e

Total project emissions (PE_y) : 0 tCO₂e

Total leakage (L_y) : 0 tCO₂e

Total Emission Reductions (ER_y) : $ER_y = BE_y - PE_y - L_y$
= 3,614,268 tCO₂e

JCI checked the all calculation in the spread sheet of ER calculation /6/ and confirmed that there was no error in the spread sheet and also confirmed that there was no error, omission or misrepresentation in the related evidence and no discrepancy between evidence. So JCI concluded that the materiality of project was sufficiently lower than the five percent of the threshold for not 'Large project'. The project's Emission Reduction is 569,379 tCO₂e per year in the registered PD /1/ and then the project is categorized as 'Project' not 'Large project' in VCS Program.

Table 16 Protocol (CL-9)

No. of request	CL-9
Clarification request	MR 4.4. Summary of GHG Emission Reduction and Removals The ERY average value of 602,305 tCO ₂ e/y shall be re-checked.
Reference	
Summary of project owner response	The average value of emission reduction is re-calculated. The re-calculated value is 628,568 tCO ₂ e.
Verification team conclusion	The value has been re-calculated appropriately. CL-9 was resolved and closed

Table 17 Protocol (CL-10)

No. of request	CL-10
Clarification request	MR 5. Additional Information This clause is not reported.
Reference	
Summary of project owner response	A table about the operating data from the monitoring period is added in the section 5, "Additional Information".
Verification team conclusion	The Monitoring Report has revised appropriately. CL-10 was resolved and closed.

4.3 Quality of Evidence to Determine GHG Emission Reductions or Removals

Through the verification process, JCI has used the relevant and reliable evidence listed in 3.2 Document Review of this report.

The evidences covering the monitoring period from 01/04/2006 to 31/12/2011 were provided by the project proponent and the VCS consultant, and JCI was able to validate the figures stated in the Monitoring Report /5/. All the measured monitoring data were obtained from the monitoring instruments appropriately calibrated and operated in accordance with the PD including Monitoring Plan and the National Regulations.

All of data and parameters used for the determination of the Emission Reduction ERY are discussed in this Verification Report. Those data recorded and parameters are derived from the Monitoring Report /5/ and the registered PD including the Monitoring Plan /1/.

4.4 Management and Operational System

The project owner prepared the VCS Monitoring Management Manual /41/ to stipulate the organization and role of VCS management team, data collection process, monitoring device calibration, ER calculation, data and information preservation and so on.

JCI confirmed through the desk review and on-site assessment that the monitoring data and information management has been implemented consistent with the PD including the Monitoring Plan /1/ in accordance with the requirement of VCS Program.

Table 18 Protocol (CL-11)

No. of request	CL-11
Clarification request	MR 3.3 Description of the Monitoring Plan The VCS Monitoring Report Template requires reporting organizational structure, data handling procedure and so on. The Monitoring Report does not report such items.
Reference	
Summary of project owner response	The information about the outline of the reporting organizational structure and data handling procedure is added.
Verification team conclusion	The information of monitoring way has added appropriately in the Monitoring Report. CL-11 was resolved and closed.

5 VERIFICATION CONCLUSION

Japan Consulting Institute (JCI) has performed the verification of the project “4×50MW Dayingjiang-3 Hydropower Project Phases 1&2”, with regard to the relevant requirements of VCS Program. This verification covers the period from 01/04/2006 to 31/12/2011.

It is JCI’s responsibility to express an independent verification statement on the reported GHG emissions and the GHG emission reductions both from the project activity for the period.

JCI’s verification is based on the requirements as defined under the VCS Program Guide /15/ and VCS Standard /16/, as well as the related VCS Guidance including the Validation and Verification Manual /18/.

The verification was performed based on the following documentation:

- 1) Registered PD dated 09/10/2009 /1/.
- 2) Approved monitoring methodology ACM0002 (ver.10), “*Consolidated methodology for grid-connected electricity generation from renewable sources*” /11/.
- 3) Tool to calculate the emission factor for an electricity system, version 01.1 /14/
- 4) Monitoring Report version 01.1 dated 31/05/2012 /4/ and version 03.1 dated 13/03/2013 /5/.

The verification process covered the auditing techniques to assess the quality of the information including desk review and on-site assessment, and also the quality confirmation of evidence in accordance with VCS Validation and Verification manual (Version 3.0) /18/.

JCI has verified that the information provided by the Project proponents was actual and representative of current operation of the project activity, that it has been in accordance with the Monitoring Plan in the registered PD /1/ and the applied Methodology /11/, and that the emissions reduction achieved have been correctly determined.

In summary, it is JCI’s opinion, as Validation/Verification body, that the information, described in the Monitoring Report version 03.1 /5/, meets all relevant VCS rules and requirements of the VCS Program. And also, based on the information confirmed and verified by JCI, it is JCI’s opinion that 3,614,268 tonnes of CO₂ equivalents, indicated in the Monitoring Report version 03.1 /5/, is correctly determined as the Emission Reductions by the Project proponent during the period from 01st April 2006 to 31st December 2011. JCI thus requests the issuance of the VCUs as a VCS project activity.

Table 19 GHG Emission Reduction

GHG Emission Reductions or Removals	tCO ₂ e
Baseline Emissions	3,614,268
Project Emissions	0
Leakage	0
Net GHG emission reductions or removals	3,614,268