



Voluntary Carbon Standard Version 2007.1
Verification Report: Final Verification Report (Version 5.0)

Verification of the VCS project:

**“Guizhou Qingshuihe Gelibridge
Hydropower Project”**

Monitoring Period: Feb.6th, 2010 - Oct.3rd, 2010

Report No: CDM-Ver-2010-0015 (VER verification)

Date: Jul. 5th, 2011

CHINA QUALITY CERTIFICATION CENTRE

VCS 2007 Verification Report Template

Name of Verification company:	Date of the issue:
China Quality Certification Centre	Jul 5 th , 2011
Report Title:	Approved by:
Verification of the VCS project: Guizhou Qingshuihe Gelibridge Hydropower Project.	
Client:	Project Title:
Sindicatum Carbon Capital Ltd(SCC).	Guizhou Qingshuihe Gelibridge Hydropower Project
Summary:	
China Quality Certification Centre (CQC) is commissioned by SCC to perform a verification of emission reductions of the project -'Guizhou Qingshuihe Gelibridge Hydropower Project' achieved during the period Feb.6th, 2010 to Oct.3rd, 2010. This project is developed by Guizhou Wujiang Qingshuihe Hydropower Development Co., Ltd. which is located in Maoyun village, Kaiyang county, Guizhou province, P.R. China. The installed capacity of this project is 150MW (2*75MW), which includes a reservoir, and the electricity will be delivered to the South China Power Grid(SCPG). The project was registered as CDM project under the UNFCCC with the Registration Ref. No. 3351 on Oct.4th 2010. The verification is conducted as per the registered CDM PDD version 10, the methodology ACM 0002 (Version 09) (the version applied by the registered CDM PDD),and the relevant requirements of Voluntary Carbon Standard 2007.1. A risk-based approach and a document review and on-site visit combined method were followed by CQC team to perform this verification. In the course of the verification, 2 Clarification s were raised and successfully closed. Based on the information and evidence observed and evaluated during document review and on-site assessment, CQC team confirms that: - The project is implemented as per the registered CDM PDD. However, during the course of the verification, it was found that generator and turbine models installed on-site were different from the ones described in the registered PDD version 9 dated Sep. 25th, 2010. For CDM purposes and in accordance with Annex 66 of the CDM Executive Board 48th Meeting Report a notification of project activity change was submitted to the UNFCCC. The conclusion of the notification was that the difference in equipment models had no impact on the scale of the project activity, the project's additionality, or the application of the methodology. The project activity change was accepted by the UNFCCC on Apr.7th, 2011; - Monitoring report complies with the applied methodology ACM0002 (version 09).; - the monitoring is implemented as per monitoring plan; - the GHG emission reductions are calculated without material misstatements. Therefore, CQC team confirms the following statements: - Reporting period: from Feb.6th2010 to Oct.3rd2010. - Verified emission in the above reporting period: - Baseline emissions: 235,906.3 tCO₂ equivalents - Project emissions:11.886 tCO₂ equivalents - Emission Reductions: 235,894 tCO₂ equivalents	
Work carried out by:	Technical reviewer
Mr. Dong Chunsong Mr. Gu Liran Mr. Tao Hua Mr. Cao Jun	Ms. zhang lixin
Number of pages:	19

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Abbreviations

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CL	Clarification
CO₂	Carbon dioxide
CO₂e	Carbon dioxide equivalent
CQC	China Quality Certification Centre
FAR	Further Action Request
GHG	Greenhouse Gas
MR	Monitoring Report
SCPG	South China Power Grid
PDD	Project Design Document
PP	Project Participant
VCS	Verified Carbon Standard ¹
VCU	Verified Carbon Unit ²
UNFCCC	United Nations Framework Convention on Climate Change
VVM	Clean Development Mechanism Validation and Verification Manual

¹ Formerly the Voluntary Carbon Standard, the organization changed its name to Verified Carbon Standard, effective from 1 March 2011: <http://www.v-c-s.org/docs/VCS%20Policy%20Announcement%20VCU%20Name%20change%201%20FEB%202011.pdf>

² Formerly Voluntary Carbon Unit, the unit has been renamed to Verified Carbon Unit, effective from 1 March 2011: <http://www.v-c-s.org/docs/VCS%20Policy%20Announcement%20VCU%20Name%20change%201%20FEB%202011.pdf>

1 INTRODUCTION

1.1 Objective

The purpose of this verification, by checking the objective evidences independently, is as follows:

- to verify whether the reductions generated by the project are in line with the VCS 2007.1 and the information provided by the project participants contains all the necessary information to evidence the project's compliance with all criteria in the Verified Carbon Standard (VCS),
- to verify whether the implementation of the project is consistent with the description in the Monitoring Report (MR) and Project Design Document(PDD) and the monitoring system is fully functional to generate Verified Carbon Units (VCUs) without any double counting,
- to verify whether the data reported are accurate, complete, consistent, transparent and free of material error or omission by assessing the monitoring records and the emissions reduction calculation, and
- to validate whether the VCS requirements not covered by the CDM validation are met by the project.

1.2 Scope and Criteria

The verification of this VCS project is based on the Monitoring Report^{/1/}, the validated CDM project design document (PDD)^{/3/} and the supporting documents and information and during the on-site assessment. Furthermore, publicly available information was considered as well.

CQC team has employed a risk-based approach in the verification, focusing on the identification of significant risks and reliability of system monitoring and generation of emission reductions according to the relevant applicable rules for VCUs verification under the VCS.

This verification is not intended to provide any consulting services to the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the project monitoring towards reductions in the GHG emissions.

1.3 VCS project Description

The installed capacity of this project is 150MW (2*75MW) which was partially commissioned (1 of 2 turbines) on February 6, 2010 and fully commissioned on March 12, 2010. The project generates electricity to be supplied to the South China Power Grid via the local Guizhou Power Grid. The project, which includes a reservoir with a power density of 70.42W/m², is expected to produce 508GWh of electricity annually, of which 497.3 GWh will be delivered to the power grid, and the remainder

used for the operation of the plant/site.

The purpose of the project activity is to deliver electricity to South China Power Grid (SCPG) which is dominated by fossil fuel-fired power plants, thus GHG emission reductions are achieved.

1.3.1 Project Category

According to the VCS 2007.1 Guidelines and the list of Sectoral Scopes of the UNFCCC, the project is applicable under the following activity categories:

- category 1 – Renewable energy (wind, PV, solar, thermal, biomass, liquid biofuels, geothermal, run-of-river hydro).

According to Annex A of the Kyoto Protocol, the project is applicable under the sectoral scope 1:

- Energy Industries (renewable/ non-renewable sources).

1.3.2 Geographic Location

The project is located in Maoyun village, Kaiyang county, Ya'an City, Guizhou province, P. R. China; and is operated by Guizhou Wujiang Qingshuihe Hydropower Development Co., Ltd. The detailed location is Maoyun village in Kaiyang county of Guizhou province, the People's Republic of China. The dam is located at 27°0'30"N and 107°12'22"E (Google Earth coordinates 27.008333 and 107.206111) and the powerhouse is located at 27°0'33"N and 107°12'2"E (Google Earth coordinates 27.009167 and 107.200556). All of the information was checked and confirmed by the CQC team during the on-site visit.

1.3.3 Project Background

The applied baseline and monitoring methodology is approved methodology - ACM0002 "Consolidated methodology for grid-connected electricity generation from renewable sources" (version 09).

The main construction of the project includes dam gates, flood discharge gates, power house and switch station, etc. The Project installed two turbines with a single unit capacity of 75MW as described in the PDD.

The project was registered as a CDM project under the UNFCCC on Oct.4th 2010 and the Registration Ref. No. is 3351. The project calculated emission reductions generated by the project from Feb.6th 2010 to Oct.3rd 2010 prior to CDM registration. The project emission reductions are determined by multiplying the net amount of electricity supplied to the grid by the project by a fixed grid emission coefficient (0.7794 tCO₂e / MWh) which was defined ex-ante for the first crediting period according to the registered CDM PDD^{3/}.

1.4 Level of assurance

The verification report is based on desk review, on-site assessment, background investigation and follow-up interview with relevant personnel, CQC team focused on providing a reasonable level of assurance that:

- the emission reductions calculation methodology used is appropriate and

- correctly applied, and
- the emission reductions are accurately monitored.

2 VERIFICATION METHODOLOGY

CQC team based on the CDM Validation and Verification Manual (VVM, version 01.2), applied by a risk-based approach in the verification, focusing on the identification of significant risks for project implementation and the generation of VCUs. The verification consists of the following steps:

- a desk review of the registered CDM PDD, the VCS MR, performance records and supporting documents submitted by PPs;
- on-site assessment;
- background investigation and follow-up interviews with personnel of the PPs;
- raising CARs, CLs, FARs when appropriate and issuing the draft verification report;
- issuing the final verification report.

The following sections outline each step in detail.

2.1 Verification Team Appointment

Based on the CDM requirements of competency, experience and qualified sectoral scopes, CQC composed a verification team in accordance with CQC's internal procedures.

Table 1: Verification Team

Qualification	Last name	First name	Country
Verification team leader	Dong	Chunsong	China
CDM verifier	Gu	Liran	China
CDM verifier	Tao	Hua	China
Technical expert (hydropower)	Cao	Jun	China
Technical reviewer	Zhang	Lixin	China

2.2 Desk Review of Documentation

PP submitted the Monitoring Report (Version 01) to CQC on 19/11/2010. Furthermore, the verification team has used technical information from sources other than Monitoring Report such as registered CDM PDD, Validation report, approved methodology ACM0002 (Version 09) which are related to the project design. Then, a desk review of documentation was conducted by CQC team according to the VCS 2007.1 guidelines;

2.3 Site Visit

During 13~14/12/2010, CQC team(Mr. Gu Liran, Mr. Dong Chunsong & Mr. Cao Jun) conducted an on-site visit to confirm selected information and to resolve issues identified during the document review. During the on-site visit, the representatives of the PP and the consultant were interviewed. The key interviewee and main topics of the interviews for on-site visit are summarized in Table 2.

Table 2: Site-visit Interviewee and Interview Topics

Date	Interviewee	Organization	Interview Topics
13/12/2010	Mr. Fei Jing GM Mr. Luo Yong Deputy GM Ms. Cai Jian CDM Director Ms. Mei Xiao CDM Manager Mr. Li Guiping Operator Mr. Zhang Yun Operator Mr. Zhong Qiao Operator Mr. Xiao Di Operator Mr. Chen Feng Operator Mr. Li Yi Operator Mr. Sven JP Starckx Sr. Tech. Advisor Mon & Rep. Ms. Zhang Min Senior Project Manager Ms. Luo Lijuan CDM Project Coordinator Ms. Zu Yiming Climate Change Associate	Guizhou Wujiang Qingshuihe Hydropower Development Co., Ltd. Gelibridge Hydropower Station Sindicatum Carbon Capital Ltd.	- Project design and implementation; - Hydro turbines & generators operation; - Equipments maintenance and repair; - Electric meter equipments calibration and verification; - Monitoring plan and management procedure; - Monitor data; - Training and QA/QC; - GHG calculation; - Environmental impacts; - Compliance with national and local laws and regulations for calibration and verification.
14/12/2010	Mr. Fei Jing GM Mr. Luo Yong Deputy GM Mr. Sven JP Starckx Sr. Tech. Advisor Mon & Rep. Ms. Zhang Min	Guizhou Wujiang Qingshuihe Hydropower Development Co., Ltd. Sindicatum Carbon Capital Ltd.	- Monitoring plan; - GHG calculations; - Monitored data and monitoring report.

	Senior Project Manager Ms. Luo Lijuan CDM Project Coordinator Ms. Zu Yiming Climate Change Associate Mr. Zhang Mingxue Deputy Director General	Kaiyang County Environmental Protection Bureau	- Environmental impacts;
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2.4 Report of Findings

CQC team establishes verification findings based on the results of evaluation of the collected verification evidence against verification criteria.

While aiming to resolve any outstanding issues which needed to be clarified about the project implementation and monitoring, findings established during the verification can either be seen as a non-fulfillment of the VCU Verification Criteria or where a risk to the fulfillment of project objectives is identified.

Corrective action requests (CAR) are issued, where:

- mistakes have been made with a direct influence on project results requiring adjustments of the VERs/VCUs monitoring report, or
- applicable methodological specific requirements have not been met.

A clarification action request (CL) may be used where additional information is needed to fully clarify an issue.

A forward action request (FAR) should be issued, where:

- the actual project monitoring and reporting practices requires attention and /or adjustment for the next consecutive verification period, or
- an adjustment of the MP is recommended.

In the context of FARs, risks have been identified, which may endanger the delivery of high quality emissions reductions in the future, i.e. by deviations from standard procedures. As a consequence, such aspects should receive a special focus during the next consecutive verification. A FAR may originate from the lack of data sustaining claimed emission reductions.

2.5 Final Report

The draft verification report containing a set of CLs was submitted to the PPs on Feb. 13th, 2011. After reviewing the revised and resubmitted MR (version 5) ^{/3/} and verifying the clarifications, CQC issues this final verification report.

2.6 Internal Quality Control

The final verification report including the verification findings underwent a technical review before being submitted to the PPs and requesting issuance of the VCUs according to CQC internal procedure CDMP09. The technical review was performed

by technical reviewer qualified in accordance with CQC's internal procedure CDMP01.

3 VERIFICATION FINDINGS

3.1 Remaining issues, including any material discrepancy, from previous verification

The CDM validation report^{/4/} did not identify any remaining issues to be checked during this verification.

3.2 Project Implementation in Accordance with the Registered CDM PDD

The project is located in Maoyun village, Kaiyang county, Ya'an City, Guizhou province, P. R. China; and is operated by Guizhou Wujiang Qingshuihe Hydropower Development Co., Ltd. CQC team checked the Business License^{/5/} of the project owner during the on-site visit. The project started electricity generation on Feb. 6th, 2010 under a signed Power Sales & Purchase Contract^{/6/} and this was confirmed by CQC team on-site visit. All of the information was checked and confirmed by CQC team during the on-site visit.

During on-site visit, CQC team has checked the name plates, *Purchase contracts*^{/7/} and the *Technical Agreements* of the above equipments and the quantity of turbines and generators, and found that the type of the turbine and generator installed on-site is not consistent with the description of registered PDD version 9 and the detailed information was presented as following table:

Table 3: Key equipments (turbines and generators) of the hydropower station

--	Turbines		Generators	
--	Type	Quantity	Type	Quantity
Actual turbines and generators installed in hydropower station	HL233-LJ-328	2	SF75-28/7300	2
Turbines and generators described in the registered PDD	HL234-LJ-335	2	SF75-28/6740	2

With respect to this point, CL01 was raised during this verification.

CL01: The type of the Key equipments (turbine: HL233-LJ-328 and generator: SF75-28/7300) in actual installation is not consistent with the description of registered PDD (turbine: HL234-LJ-335 and generator: SF75-28/6740), the difference between these 2 types should be further clarified.

Summary of project owner response:

Response 1: The model number for the turbines and generators provided in table A.4.1 on page 6 of the registered CDM-PDD clearly refers to the model numbers included within the FSR. As indicated within the PDD the FSR was completed in 2006.

At the time the turbines were purchased, the turbine model identification number indicated by the design institute for the development of the FSR was no longer in use, hence similar turbines/gen sets (by the same provider) were purchased (refer to Turbine and generator purchasing agreement, contract number GLQ-JD-02, dated 10/06/2007 between Tianjing Tianfa Heavy Machinery and Hydropower Equipment manufacturing Co., Ltd. and Guizhou Wujiang Qingshuihe Hydropower Development Co., Ltd. (project owner).

This purchasing contract referenced in the registered PDD (and part of the validation), clearly mentions the model number and technical specifications (including the model identification numbers (turbine: HL233-LJ-328 and generator: SF75-28/7300) for the turbines/generators delivered and installed.

This equipment purchasing agreement including the details, specifications and costs mentioned in the registered PDD were presented to the CDM validating DOE (TUV-Sud) as part of the validation process and the impact on additionality, capacity/scale and meth application have been assessed during the validation process (see reference number 27 included in the validation report by TUV-Sud).

Turbines per the FSR/registered CDM-PDD:

Model number: HL234-LJ-335

Total installed capacity: 150 MW

Rotation speed of Turbine: 214.3 r/min

Specific speed of turbine: 234 m.KW (at rated water head 84 m)

Installed turbines per the Equipment Procurement and Construction (EPC) no. GLQ-JD-02 dated 10/06/2007 (see page 112 of the validation report):

Model number: HL233-LJ-328

Total installed capacity: 150 MW

Rotation speed: 214.3 r/min

Specific speed: 233.7 m.kW (at rated water head 84m)

Generators per the FSR/registered CDM-PDD:

Model number: SF75-28/6740

Rated capacity (SN/PN): 88.23 MVA / 75 MW

Power factor: 0.85

Installed generators per the Equipment Procurement and Construction (EPC) no. GLQ-JD-02 dated 10/06/2007 (see page 112 of the validation report):

Model number: SF75-28/7300

Rated capacity (SN/PN): 88.23 MVA / 75MW

Power factor: 0.85

$88.23 \text{ MVA} \times 0.85 = 74.99 \text{ MW}$ (Volt*Ampere = Watt)

Generators are limiting factor, therefore for the 2 similar electricity lines installed: $2 \times 74.99 = 150 \text{ MW}$.

From the above it can be concluded that the installed capacity is compliant with the capacities/specifications mentioned within the FSR/registered CDM-PDD and the purchasing agreement - and the difference is a change in model identification reference/name between the FSR (2006) and equipment purchase agreement (2007).

However the purchase agreement (mentioning the model identification numbers and installed) has been clearly referenced in the registered PDD and the supporting documentation has been part of the validation process ensuring compliance with the project activity stated within the PDD (implementation of a hydropower project with a total installed capacity of 150 MW). These contracts were part of the additionality, scale and applicability of the methodology review by TUV-Sud.

As such between the time of validation, implementation and verification no project activity change has occurred.

Response 2: There has been one notification of changes in the project activity as described in the CDM-PDD. The generator and turbine equipment model numbers referenced in the FSR and version 9 of the PDD (registered on 4 October 2010) differed from the actual installed equipment (refer to section A.4 for details). A validation opinion on the project activity change, notification to the UNFCCC of the project activity change in accordance with Annex 66 of the Executive Board's 48th Meeting Report, revised PDD (version 10 dated 25 February 2011) and revised CER and IRR calculations spreadsheet (version 9 dated 25 February 2011) was submitted to the UNFCCC in January and February 2011. The validation opinion concluded that the change in equipment model numbers had no impact on the scale of the project activity, the project's additionality, or the application of the methodology.

The validation opinion and notification on project activity changes for the project was accepted on 07 April 2011 (refer to <http://cdm.unfccc.int/Projects/DB/TUEV-SUED1265278332.26/view> for details).

The monitoring report has been revised to reflect the project activity change and resulting approval from the Secretariat and EB.

CQC's conclusion: The difference in installed model numbers for the turbines and generators compared to that indicated in the registered CDM PDD of the project activity has no impact on the additionality scale of project activity, or applicability of the methodology; what's more the project activity change was accepted by the UNFCCC on Apr. 7th, 2011; hence, **CL01** is closed out.

The electricity power generated by this project is connected to the grid through the on-site booster stations, which increases the voltage from 10.5kV to 110kV, then connected by two lines to 110kV Weng'an Transformer Substation. A *Power Sales & Purchase Contract*^{/6/} between the project owner and the grid company was signed on 01/01/2010.

A Grid-connected Diagram^{/9/} describes the grid connection manner, which is consistent with the description of the registered PDD;

Two electric meters (with common code E3, installed on line 1 and line 2 respectively, Manufacturer: EDM, bi-direction, accuracy 0.2S) for monitoring the net electricity supplied to SCPG by the project have been installed well. These meters are used as the main meters, and installed at the grid interface to the 110kV Weng'an Transformer Substation to measure the electricity supplied to SCPG by the project and the electricity supplied to the project by SCPG^{/6//9/}. Two backup meters (with common code E4, installed on line 1 and line 2 respectively, Manufacturer: EDM, bi-direction, accuracy 0.2S) were installed at the on-site booster station of the project.

Based on the verification findings and additional information provided by the PPs, CQC team confirms that:

- The difference types between the turbines and generators and that indicated in the registered CDM PDD of the project activity has no impact on the additionality, scale of project activity, or applicability of the methodology;
- The actual implementation of the proposed CDM project activity is as per the registered PDD by the PP;
- Information (data and variables) provided in the monitoring report is in accordance with that stated in the registered PDD.

3.3 Compliance of the Monitoring Plan with the Monitoring Methodology

The approved consolidated monitoring methodology ACM0002 (Version 09) "*Consolidated baseline methodology for grid-connected electricity generation from renewable sources*" is applied to the project.

As per the Registered PDD, the monitoring plan contains:

- The management structure of the project and management responsibilities for relevant person in the project;
- The installation of metering equipment & systems;

- Calibration requirements of metering equipment, frequency and accuracy;
- Monitoring data (mentioned above);
- Quality control including internal inspection for data and other process;
- Date retention place and period;
- Reporting modality and requirements.

PP has developed CDM monitoring & Quality control manual (version 6) according to the above monitoring plan. PP has implemented the monitoring plan as per the manual during this monitoring period.

PP has developed documentation (including Monitoring Report, registered PDD and *CDM Monitoring Manual*^{10/10/} and *Internal audit report*^{11/}, *CDM monitoring organization structure*^{12/}) according to the above monitoring plan. PP has implemented the monitoring plan as per the manual during this monitoring period.

CQC verification team confirms that the monitoring plan described in the registered PDD is in accordance with the approved monitoring methodology applied by the project.

3.4 Compliance of Monitoring with the Monitoring Plan

3.4.1 Monitoring Equipments Application and Calibration

3.4.1.1 EG_y : Net Electricity Supplied to the Grid

As per registered PDD, the parameters ($EG_{out, y}$ and $E_{in, y}$) shall be measured continuously by the main meters (E3) and checked by the backup meters (E4). Both the main meters and backup meters are bi-direction. The value in the direction from power plant to the grid is for $EG_{out, y}$, while the value in opposite direction is for $E_{in, y}$.

TEG_y : net power generation supplied to the grid by the project in year y (MWh)

$EG_{out, y}$: is the power supplied to the grid (MWh)

$E_{in, y}$: is the electricity use of the power plant imported from the grid.

$(TEG_y = EG_{out, y} - E_{in, y})$

During the on-site visit, verification team found that both main meters and backup meters had been well installed. The meters were in good condition and calibrated. The main meter was calibrated by Guizhou Electric Power Test & Research Institute^{13/}, which is in accordance with the requirements of the monitoring plan. The backup meters were also calibrated by the same institute^{14/}. The testing body is accredited by the relevant government agency^{15/}.

CQC team confirms that the calibrations were carried out in accordance with Chinese standards^{8/9/}, which require that the verification/calibration should be at least once in a 5-year circle; the calibrations are also in accordance with the requirement of MP in the registered PDD. In addition, the valid period of calibration can cover this monitoring period.

Meters E1, E2, ES1 and ES2 metering equipment are used for operational purposes and serve as backup meters in case of irregularities/failure in the E3 (backup E4) export readings, which were calibrated^{/16/} in accordance with Chinese standards^{/8//9/} as well.

The verification and calibration records of the meters are described in the following table:

Table 4: Information of Main and Backup Meters installed at the hydropower station

Function	Main meters (E3)	Backup meters (E4)	E1	E2	ES1	ES2
SN	208368562 (E3L1) 208368563 (E3L2)	208368565 (E4L1) 208368572 (E4L2)	207502248 (E1L1) 207502246 (E1L2)	207502257 (E2L1) 207502242 (E2L2)	207502244	207502243
Type/ Model	Mk6E	Mk6E	2000-0600	2000-0600	2000-0600	2000-0600
Manufacturer	EDMI	EDMI	EDMI	EDMI	EDMI	EDMI
Accuracy	0.2S	0.2S	0.5S	0.5S	0.5S	0.5S
Valid Period of calibration	12/10/2009~11/10/2010	12/10/2009~11/10/2010	13/10/2009~12/10/2014	13/10/2009~12/10/2014	13/10/2009~12/10/2012	13/10/2009~12/10/2014

However, CL02 was raised during this verification:

CL02: Descriptions of ES1 and ES2 are missing in the MR version 1.

Summary of project owner response: The MR has been updated (refer to version 5 dated 14 Jun. 2011) to include descriptions of meters ES1 and ES2. Refer to details for parameter TEGy in section 5.2 of the MR version 5.

CQC's conclusion: The descriptions of ES1 and ES2 were added in the MR ver.4. Hence CL02 is closed out.

During the on-site visit, CQC team checked the balanced bills and the readings of the meters, cross-checked with the electricity sales invoice. The readings of the main meters (E3) and back up meters (E4) are recorded on the approved frequency. Data from meters E3 (and E4) are manually recorded daily at 24:00 hours by the duty operators at the last date of every month. The data collection was consistent with the registered PDD during the monitoring period. The meters' readings, which are the primary data to calculate emission reductions as set out in the registered CDM PDD, have been cross-checked by CQC team against the sales invoices. CQC team confirms that the main meters' readings are acceptable though there is a slight difference between the readings and sales invoices due to the readings are rounded by Grid company for the purpose of simplified calculation.

3.4.1.2 Installed Capacity of the Hydropower Plant (Cap_{PJ})

As per the registered PDD, the parameter Cap_{PJ} (installed capacity of the hydropower plant) shall be measured by the mark of the generator units. During the on-site visit, CQC team interviewed the CDM Manager, CDM Director, Deputy GM and GM of the project owner, checked the nameplates on the turbine-generator units,

reviewed the Hydro turbine-generator units purchase contracts^{/7/} and Technical agreement of hydro turbine-generator units^{/8/} and confirmed the installed capacity of the hydropower plant is consistent with the design of PDD.

3.4.1.3 Area of the Reservoir (A_{PJ})

As per the registered PDD, the parameter – A_{PJ} (the area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full) shall be measured from topographical survey, maps, satellite pictures etc. The PP employed the Planning and Design Branch of the Guiyang Hydroelectric Investigation, Design & Research Institute of China Hydropower Engineering Consulting Group^{/17/} to measure the surface area (A_{PJ}) as per the applied methodology – ACM0002 (version 09) and registered PDD. In the Report “Validation of the Stage, Capacity and Area Curve of Qingshuihe Gelibridge Hydropower Plant”^{/18/}, the institute indicated that the measurement method was topographical survey, the surface areas of the station when the reservoirs at full level were: 2,133,000m² and then the actual power density is 70.32W/m², the measured result indicates that the power density of the project are higher than 10W/m². According to ACM0002, version 9, leakage of this project is zero.

3.4.1.4 Quantity of diesel fuel consumed for the Emergency Backup Diesel Generator

During the on-site visit, it was found that one backup diesel generator is installed for emergency uses only. The PP recorded the operation of backup diesel generator and CQC team checked this record during the on-site visit. The backup diesel generator was only used for emergency starting up the power system. The operational records^{/19/} of the backup diesel generator indicated that Quantity of diesel fuel consumed by the backup generator within this monitoring period was 3.73 tons totally.

CQC team therefore confirmed that the measurement of Cap_{PJ} & A_{PJ} and quantity of diesel fuel consumed for the Emergency Backup Diesel Generator was consistent with the registered PDD.

3.4.2 Management System and Quality Assurance

As per the registered PDD, the CDM Project Monitoring Management Manual has clearly prescribed the management and operational procedures.

The project owner is responsible for overall monitoring. The monitoring officer has been established for monitoring of power generation and maintenance and operation of the power station. The relevant management structure for the monitoring of emission reductions has also been established as follows:

- **CDM Managers:** are responsible for the measurement of electricity supplied to the grid;
- **CDM Director:** is end responsible for the checks of monitoring and recording tasks (such as meter readings and sales invoices), emission reductions calculations and the preparation of monitoring reports are responsible for the measurement of the electricity supplied to the grid;

- **General Manager:** is responsible for the reviewing of the relevant CDM monitoring data.

Through the on-site visit and reviewing of documentations^{/10//16/}, CQC team confirmed that all the above responsibilities were implemented well and in accordance with the monitoring plan in the registered PDD.

CQC team has also checked the *internal audit report* and the training record^{/20/} and found that the internal audit as well as the training was conducted in compliance with the monitoring plan.

Therefore, CQC team confirms that the monitoring is in accordance with the monitoring plan in the registered PDD.

3.5 Assessment of Data and Calculation of GHG Emission Reductions

According to the registered PDD and the Monitoring Report, the emission reductions of this project are determined by the Emission Factor (EF) multiplied by the net electricity supplied to the grid. The operation of the backup diesel generator was considered as project emissions of the project activity, as per the registered PDD. The EF of SCPG and EF of diesel combustion were fixed ex-ante for the first crediting period. Therefore, the critical parameters of the project to be monitored are the net electricity supplied to the grid and the quantity of diesel fuel consumed by the backup diesel generator.

$$ER_y = BE_y - PE_y - LE_y \quad (1)$$

$$BE_y = TEG_y \times EF_y \quad (2)$$

Where,

ER_y is emission reductions,

BE_y is the baseline emission during a given year,

PE_y is the emission from the project activity in the year y,

LE_y is the leakage from the project activity,

TEG_y is the net electricity supplied by the project activity to the grid, in MWh,

EF_y is the baseline emission factor of SCPG, in tCO₂e/MWh,

EF_{diesel} is the emission factor of diesel usage of the backup diesel generator's operation, in tCO₂e/ton.

As per the registered PDD and the applied methodology (ACM0002, version 09) of the project, the parameter - LE_y is zero. In addition, the 2 EFs of baseline & diesel usage had been determined ex-ante as 0.7794tCO₂e/MWh & 3.19tCO₂e/ton, respectively.

Therefore,

$$ER_y = BE_y - PE_y - LE_y = TEG_y \times 0.7794 - PE_y \quad (3)$$

The verification team cross-checked the readings of the meters, monthly balance bills^{/21/} and the sales invoices^{/22/} and confirms that appropriate methods and formulae for calculation baseline emissions and project emissions have been followed.

1) The calculation sheet of baseline emissions (**BE_y**) of the monitoring period is presented as following table:

Table 5: The calculation sheet of baseline emissions(BE_y) by the project

Date	Electricity Supplied to the Grid (Electricity Meter Readings) (E _{out,y}) (MWh)	Electricity Consumed by the plant from the Grid (Electricity Meter Readings) (E _{in,y})(MWh)	Net Electricity Supplied to the Grid (TEG _y) (MWh)	Grid Emission Factor (EF _{grid,CM,y}) (tCO ₂ e/MWh)	Baseline Emissions (BE _y) (Electricity Meter Readings) (tCO ₂ e)
	A	B	A-B	C	D=(A-B)XC
Feb. 6-28, 2010	10351.8	2.2	10,349.6	0.7794	8,066.5
Mar. 2010	30,226.9	7.7	30,219.2	0.7794	23,552.8
Apr. 2010	15,997.3	3.3	15,994.0	0.7794	12,465.7
May 2010	24,273.7	2.2	24,271.5	0.7794	18,917.2
Jun. 2010	67,114.3	1.1	67,113.2	0.7794	52,308.0
Jul. 2010	91,385.8	0	91,385.8	0.7794	71,226.1
Aug. 2010	35,662	6.6	35,655.4	0.7794	27,789.8
Sep. 2010	21,386.2	0	21,386.2	0.7794	16,668.4
Oct. 1-3, 2010	6,301.9	0	6,301.9	0.7794	4,911.7
Total	302,676.8	23.1	302,699.9	0.7794	235,906.3

2) The calculation sheet of project emissions (**PE_y**) of the monitoring period is presented as following table:

Table 6: The calculation sheet of project emissions (PE_y) by the project

Date	Quantity of diesel fuel consumed (tons)	COEF _{i,y} (tCO ₂ e/ton)	Project Emissions from Diesel consumption (PE _y) (tCO ₂ e)
	E	F	G=EXF
Feb. 6 th 2010-- Oct. 3 rd 2010	3.7260	3.19	11.886

3) The calculation sheet of emission reductions (**ER_y**) of the monitoring period is presented as following table:

Table 7: The calculation sheet of emission reductions (ER_y) by the project

Date	Baseline Emissions (BE _y) (Electricity Meter Readings) (tCO ₂ e)	Project Emissions from Diesel consumption (PE _y) (tCO ₂ e)	Emission Reductions (ER _y)(tCO ₂ e)
	D	G	H=D-G
Feb. 6 th 2010-- Oct. 3 rd 2010	235,906.3	11.886	235,894.4

4 VERIFICATION CONCLUSIONS

The scope of this verification covers the determination of voluntary greenhouse gas emission reductions generated by the Guizhou Qingshuihe Gelibridge Hydropower Project. The verification is based on the registered CDM PDD version 10, ACM0002 (Version 09), the MR, and the supporting documents made available to the verifiers.

As a result of the verification, CQC team confirms that:

- all equipments of the project are installed and operated well and description in the PDD. The monitoring system is in place, functional and reliable.
- the GHG emission reductions are calculated without material misstatements in a conservative and appropriate manner in the revised MR^{/2/}.

The verification statement should give the final verdict of the project in terms of the completeness, comparability, accuracy and correctness of the reported GHG emission reductions.

Reporting period: from Feb.6th2010 to Oct.3rd2010.

Verified emission in the above reporting period:

Baseline emissions: 235,906.3 tCO₂ equivalents

Project emissions: 11.886 tCO₂ equivalents

Emission Reductions: 235,894 tCO₂ equivalents.

REFERENCE

Table 5.1 Reviewed Documents Submitted by the PPs

Reference	Documents
1	VCS Monitoring Report, version 01, 25/11/2010
2	VCS Monitoring Report, version 5, 14/06/2011
3	Registered CDM Project Design Document, version 10, 25/02/2011
4	Final Validation Report issued by TUV Sud, 29/09/2010
5	Business License of Guizhou Wujiang Qingshuihe Hydropower Development Co., Ltd. issued by Industry and Commerce Administration of Guizhou Province.
6	Power Sales & Purchase Contract, 01/01/2010 signed between the Guizhou Power Grid Company and Guizhou Wujiang Qinghuishe Hydropower Development Co., Ltd
7	Hydro turbine and generator units purchase contract GLQ-JD-02 dated 10/06/2007 signed between Tianjin Tianfa Heavy Machinery and Hydropower Equipment Manufacturing Co., Ltd. and Guizhou Wujiang Qingshuihe Hydropower Development Co., Ltd
8	Technical agreement of hydro turbine-generator units
9	Grid connection diagram
10	CDM Monitoring Manual
11	Internal audit report, 25 th August 2010 issued by Sindicatum Carbon Capital for internal audit conducted by SCC at the Gelibridge Hydropower Plant.

12	CDM monitoring organization structure
13	Calibration records of the main meters, by Guizhou ELECTRIC POWER TEST & RESEARCH INSTITUTE, 12/10/2009, 15/10/2010
14	Calibration reports of the backup meters, Guizhou ELECTRIC POWER TEST & RESEARCH INSTITUTE, 12/10/2009, 15/10/2010
15	Accreditation certificates of Guizhou Electric Power Test Academen by Guizhou Quality and Technical Supervision Bureau & Guiyang Business Administration Bureau
16	Calibration reports of the backup meters E1,E2,ES1 and ES2, Guizhou ELECTRIC POWER TEST & RESEARCH INSTITUTE, 13/10/2009.
17	Accreditation certificate of the Planning and Design Branch of the Guiyang Hydroelectric Investigation, Design & Research Institute of China Hydropower Engineering Consulting Group, by Ministry of Housing & Urban-rural Development of the P. R. C.
18	Validation of the Stage, Capacity and Area Curve of Qingshuihe Gelibridge Hydropower Plant, 20/08/2010
19	Operational record of the backup diesel generator issued by the Gelibridge Hydropower Plant for February to October 2010
20	Employees CDM training record
21	Monthly balance bills of the project
22	Electricity sales invoices of the project issued by the Guizhou Power Grid Company to Guizhou Wujiang Qingshuihe Hydropower Development Co., Ltd. for February to October 2010

Table 5.2 Background Assessment Documents

Reference	Documents
VCS 2007.1	Voluntary Carbon Standard 2007.1 Guidelines.
ACM0002	Consolidated methodology for grid-connected electricity generation from renewable sources, version 09
VVM	Validation and Verification Manual (Version 01.2)

Table 5.3 Website Used

Reference	Link	Organisation
VCS	www.v-c-s.org	VCS Official Website