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Verification Report

Aqua Power Limited

**Second Periodic Verification
Of the**

“Lohgarh, Chakbhai and Sidhana Mini Hydroelectric Projects”

UNFCCC 0327-CDMP

Report No. 1001746, Version 1

12 March 2008

**TÜV SÜD Industrie Service GmbH
Carbon Management Service
Westendstr. 199 - 80686 Munich - GERMANY**

Second Periodic Verification of the “Lohgarh, Chakbhai and Sidhana Mini Hydroelectric Projects”



Page 1 of 16

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Summary: <p>TÜV SÜD Industrie Service GmbH has performed a verification of the CDM project: “Lohgarh, Chakbhai and Sidhana Mini Hydroelectric Projects”. The verification is based on the currently valid documentation of the UN Framework Convention on Climate Change (UNFCCC). In this context, the relevant documents are the "Marrakech Accords".</p> <p>The management of Aqua Power Limited is responsible for the preparation of the GHG emissions data and the reported GHG emissions reductions of the “Lohgarh, Chakbhai and Sidhana Mini Hydroelectric Projects” on the basis set out within the project Monitoring and Verification Plan indicated in the final PDD version, which was registered. The development and maintenance of records and reporting procedures in accordance with that plan, including the calculation and determination of GHG emission reductions from the project is the responsibility of the management of the project.</p> <p>The verifier confirms that the project is operated as planned and described in validated and registered project design documents except one unit at Sidhana, which is not commissioned yet. Installed equipment being essential for generating emission reduction runs reliably. The monitoring system is in place and the project is generating GHG emission reductions.</p> <p>The verifier confirms that monitoring plan of project activity is in accordance with applied methodology AMS I.D, version 7. The verifier can confirm that the GHG emission reduction is calculated without material misstatements. Our opinion relates to the project's GHG emissions and resulting GHG emissions reductions reported and related to the valid and registered project baseline and monitoring, and its associated documents. Based on the information we have seen and evaluated we confirm the following statement:</p> <p><u>Reporting period:</u> From 01-04-2006 to 30-04-2007</p> <p><u>Verified emission in the above reporting period:</u></p> <p>Baseline emissions: 22 658 t CO₂ equivalents Project emissions: 0 t CO₂ equivalents Emission reductions: 22 658 t CO₂ equivalents</p>				
Work carried out by:			Internal Quality Control by:	
<ul style="list-style-type: none">Abhishek Goyal (Assessment Team Leader)Sunil Kathuria (GHG Auditor)Supratik Dutta (GHG Auditor-Trainee)			Javier Castro	



Abbreviations

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CR	Clarification Request
DNA	Designated National Authority
DOE	Designated Operational Entity
APL	Aqua Power Limited
EB	Executive Board
ER	Emission reduction
FAR	Forward Action Request
GHG	Greenhouse gas(es)
KP	Kyoto Protocol
MP	Monitoring Plan
NGO	Non Governmental Organization
PDD	Project Design Document
PSEB	Punjab State Electricity Board
TÜV SÜD	TÜV SÜD Industrie Service GmbH
UNFCCC	United Nations Framework Convention on Climate Change
VVM	Validation and Verification Manual

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1 INTRODUCTION

1.1 Objective

Aqua Power Limited has commissioned an independent verification by TÜV SÜD Industrie Service GmbH (TÜV SÜD) of its CDM project: “Lohgarh, Chakbhai and Sidhana Mini Hydroelectric Projects”. Verification is the periodic independent review and ex post determination by the Designated Operational Entity / Independent Entity of the monitored reductions in GHG emissions during the defined verification period.

In general the objective of verification can be divided in Initial Verification and Periodic Verification:

- **Initial Verification:** The objective of an initial verification is to verify that the project is implemented as planned, to confirm that the monitoring system is in place and fully functional, and to assure that the project will generate verifiable emission reductions. A separate initial verification prior to the project entering into regular operations is not a mandatory requirement.
- **Periodic Verification:** The objective of the periodic verification is to verify that actual monitoring systems and procedures are in compliance with the monitoring systems and procedures described in the monitoring plan; further more the periodic verification evaluates the GHG emission reduction data and express a conclusion with a high, but not absolute, level of assurance about whether the reported GHG emission reduction data is “free” of material misstatements; and verifies that the reported GHG emission data is sufficiently supported by evidence, i.e. monitoring records. If no prior initial verification has been carried out, the objective of the first periodic verification also includes the objectives of the initial verification.

The verification shall consider both quantitative and qualitative information on emission reductions. Quantitative data comprises the monitoring reports submitted to the verifier by the project entity. Qualitative data comprises information on internal management controls, calculation procedures, and procedures for transfer, frequency of emissions reports, review and internal audit of calculations/data transfers.

The verification follows UNFCCC criteria; refer to the Kyoto Protocol criteria and the CDM rules and modalities as agreed in the Bonn Agreement and the Marrakech Accords.

As the project has already been initially verified in May 2006 (Verification Report No. 812601, Version 01), the assessment presented herewith only covers the tasks to be performed in the periodic verification as described above.

1.2 Scope

Verification scope is defined as an independent and objective review and ex post determination by the Designated Operational Entity of the monitored reductions in GHG emissions. The verification is based on validated project design document including baseline. These documents are reviewed against Kyoto Protocol requirements, UNFCCC rules and associated interpretations. TÜV SÜD has, based on the recommendations in the Validation and Verification Manual, and employed a risk-based approach in the verification, focusing on the identification of significant risks and reliability of project monitoring and generation of CERs.

The verification is not meant to provide any consulting towards the client. However, stated requests for clarifications and/or corrective actions may provide input for improvement of the project design.

The audit team has been provided with a Draft Monitoring Report in May 2007, covering the period 1 April, 2006 – 30 April, 2007, which has been made publicly available on the UNFCCC website (see: <http://cdm.unfccc.int/Issuance/MonitoringReports>). Based on this documentation, a document review and a fact finding mission in form of an on-site audit has taken place. Afterwards the client decided to revise the monitoring report according to the CAR and CR indicated in the audit process. The final monitoring report version submitted in January 2008 serves as the basis for the assessment presented herewith.

Studying the existing documentation belonging to this project, it was obvious that the competence and capability of the audit team performing the verification have to cover at least the following aspects:

- Knowledge of Kyoto Protocol and the Marrakech Accords
- Environmental and Social Impact Assessment
- Skills in environmental auditing (ISO 14000, EMAS)
- Quality assurance
- Technical aspects of hydropower plants
- Monitoring concepts
- Political, economical and technical random conditions in host country

According to these requirements TÜV SÜD has composed a project team in accordance with the appointment rules of the TÜV certification body “climate and energy”:

Abhishek Goyal is an Assessment Team Leader for CDM projects at TÜV SÜD Industrie Service GmbH. Before joining the TÜV SÜD Industrie Service GmbH he has worked on development of PDDs and methodologies for several energy efficiency, renewable energy, and waste to energy projects. He has extensive experience in CDM.

Sunil Kathuria is a lead auditor for quality and environmental management systems (according to ISO 9001 and ISO 14001) and auditor for CDM/JI projects at TÜV SÜD South Asia, TÜV SÜD Group. He is based in New Delhi. In his position he implements validation and verification of greenhouse gas mitigation projects within the framework of the Kyoto Protocol. He has received extensive training in the CDM validation/verification process and has already participated in several CDM project assessments.

Supratik Dutta is an expert at TÜV SÜD South Asia. He is based in Kolkata, India. He has received extensive training in the CDM validation/verification process and has already participated in several CDM project assessments.

The audit team covers the above mentioned requirements as follows:

- Knowledge of Kyoto Protocol and the Marrakech Accords (All)
- Environmental and Social Impact Assessment (Dutta)
- Skills in environmental auditing (All)
- Quality assurance (All)
- Technical aspects of hydropower plants (All)
- Monitoring concepts (All)
- Political, economical and technical random conditions in host country (All)

In order to have an internal quality control of the project, a team of the following persons has been composed by the certification body “climate and energy”:

- Javier Castro (deputy head of the certification body “climate and energy”)

1.3 GHG Project Description

The project involves the implementation of three mini hydroelectric power plants aggregating to 5.2 MW at Lohgarh, Chakbhai and Sidhana. The projects at Lohgarh and Chakbhai were already commissioned during first monitoring period and same was reported in the report for first periodic verification. The project at Sidhana was not commissioned during the current monitoring period. It has been informed to audit team that Sidhana unit has been commissioned on 25 October 2007. The electricity generated is sold to the Punjab State Electricity Board, which is part of Northern Region Grid.

Project participant is Aqua Power Limited.

The project starting date is 09/07/2003 and the start of the 10 year non renewable crediting period is on 20/11/2004

The first monitoring period of this project activity has already been verified in the first periodic verification (see Verification Report No. 812601, Version 01). This periodic verification covers the second monitoring period which directly follows the first one. There is no change in the project since initial verification.

2 METHODOLOGY

The project assessment aims at being a risk based approach and is based on the methodology developed in the Validation and Verification Manual, an initiative of all Applicant Entities, which aims to harmonize the approach and quality of all such assessments.

In order to ensure transparency, a verification protocol was customized for the project, according to the Validation and Verification Manual. The protocol shows, in a transparent manner, criteria (requirements), means of verification and the results. The verification protocol serves the following purposes:

- It organizes, details and clarifies the requirements a CDM/JI project is expected to meet;
- It ensures a transparent verification process where the verifier will document how a particular requirement has been proved and the result of the verification.

The verification protocol consists of four tables. The different columns in these tables are described in Figure 1.

The completed protocol is enclosed in Annex 1 to this report.

Periodic Verification Checklist		
Table 1: Data Management System/Controls		
Expectations for GHG data management system/controls	Score	Verifiers Comments (including Forward Action Requests)
The project operator's data management system/controls are assessed to identify reporting risks and to assess the data management system's/control's ability to mitigate reporting risks. The GHG data management system/controls are assessed against the expectations detailed in the table.	<p>A score is assigned as follows:</p> <p>Full all best-practice expectations are implemented.</p> <p>Partial a proportion of the best practice expectations is implemented</p> <p>Limited this should be given if little or none of the system component is in place.</p>	<p><i>Description of circumstances and further commendation to the conclusion. This is either acceptable based on evidence provided (OK), or a Corrective Action Request (CAR) of risk or non-compliance with stated requirements. The corrective action requests are numbered and presented to the client in the Verification report. The Initial Verification has additional Forward Action Requests (FAR). FAR indicates essential risks for further periodic verifications</i></p>

Periodic Verification Checklist		
Table 2: GHG calculation procedures and management control testing		
Identification of potential reporting risk	Identification, assessment and testing of management controls	Areas of residual risks
<p>Identification of potential reporting risks based on an assessment of the emission estimation procedures.</p> <p>Identification of key source data. Focus on those risks that impact the accuracy, completeness and consistency of the reported data.</p>	<p>Identification of the key controls for each area with potential reporting risks. Assessment of adequacy of the key controls and eventually test that the key controls are actually in operation.</p> <p>Internal controls include, Understanding of responsibilities and roles, Reporting, reviewing and formal management approval of data; Procedures for ensuring data completeness, conformance with reporting guidelines, maintenance of data trails etc.</p>	<p><i>Identification of areas of residual risks, i.e. areas of potential reporting risks where there are no adequate management controls to mitigate potential reporting risks</i></p> <p><i>Areas where data accuracy, completeness and consistency could be improved are highlighted.</i></p>

Periodic Verification Checklist		
Table 3: Detailed audit testing of residual risk areas and random testing		
Areas of residual risks	Additional verification testing performed	Conclusions and Areas Requiring Improvement (including FARs)
<p><i>List of residual areas of risks of Periodic Verification Checklist Table 2 where detailed audit testing is necessary.</i></p> <p><i>In addition, other material areas may be selected for detailed audit testing.</i></p>	<p><i>The additional verification testing performed is described. Testing may include:</i></p> <ul style="list-style-type: none"> ▪ <i>Sample cross checking of manual transfers of data</i> ▪ <i>Recalculation</i> ▪ <i>Spreadsheet ‘walk throughs’ to check links and equations</i> ▪ <i>Inspection of calibration and maintenance records for key equipment</i> ▪ <i>Check sampling analysis results</i> <p><i>Discussions with process engineers who have detailed knowledge of process uncertainty/error bands.</i></p>	<p><i>Having investigated the residual risks, the conclusions are noted here. Errors and uncertainties are highlighted.</i></p>

Figure 1 Verification Protocol Tables

2.1 Review of Documents

The monitoring report submitted by the client and additional background documents related to the project performance were reviewed. A complete list of all documents reviewed is attached as Annex 2 to this report.

2.2 Follow-up Interviews

During May 16, 2007 TÜV SÜD performed interviews with project stakeholders to confirm selected information. Representatives of Aqua Power Limited were interviewed. The main topics of the interviews are summarized in Table 1.

Table 1 Interview topics

Interviewed organization	Interview topics
Aqua Power Limited	<ul style="list-style-type: none">➤ Changes to project design and implementation since last verification➤ Technical equipment and operation➤ Monitoring plan➤ Monitored data➤ Data uncertainty and residual risks➤ GHG calculation➤ Environmental impacts➤ Compliance with national laws and regulations

2.3 Resolution of Corrective and Forward Action Requests

The objective of this phase of the verification was to resolve the requests for corrective actions and any other outstanding issues which needed to be clarified for TÜV SÜD's positive conclusion on the GHG emission reduction calculation. The Corrective Action Requests (CAR) and Clarification Requests (CR), raised by TÜV SÜD were resolved during communication between the client and TÜV SÜD. Forward Action Requests (FAR) are indicated issues which do not effect the generation of emission reduction in the verified period, but shall be improved in order to ensure the reliability of future data. To guarantee the transparency of the verification process, the concerns raised and responses that have been given are summarized in chapter 3 below and documented in more detail in the verification protocol in Annex 1.

3 VERIFICATION FINDINGS

In the following sections the findings of the verification are stated. The verification findings for each verification subject are presented as follows:

The findings from the desk review of the final monitoring report and the findings from interviews during the follow up visit are summarized. A more detailed record of these findings can be found in the Verification Protocol in annex 1.

- 1) Where TÜV SÜD had identified issues that needed clarification or that represented a risk to the fulfillment of the project objectives, CR or CAR, respectively, have been issued. The CRs or CARs are stated, where applicable, in the following sections and are further documented in the Verification Protocol in Annex 1.
- 2) Where Corrective Action Requests have been issued, the exchanges between the Client and TÜV SÜD to resolve these Corrective Action Requests are summarized.
- 3) In the context of FAR, risks have been identified, which may endanger the delivery of high quality CERs in the future, i.e. by deviations from standard procedures as defined by the MP. As a consequence, such aspects should receive a special focus during the next consecutive verification. A FAR may originate from lack of data sustaining claimed emission reductions. Forward Action Requests are understood as recommendation for future project monitoring; they are stated, where applicable, in the following sections and are further documented in the Verification Protocol in Annex 1.
- 4) The final conclusions for verification subject are presented.

The verification findings relate to the project implementation as documented and described in the final monitoring report.

Second Periodic Verification Findings

3.1 Remaining issues, CARs, FARs from initial and first periodic verification

One FAR was issued during the first periodic verification, which requested inclusion of legally binding signatures in the future monitoring reports. The monitoring report submitted to DOE in May 2007 and final report submitted in January 2008 already contained legally binding signatures.

3.2 Completeness of Monitoring

3.2.1 Discussion

Exported and imported energy readings are jointly recorded in the monthly joint metering report and net electrical energy content exported to the grid is invoiced. This parameter is most significant to determine the emission reductions from the project activity. Gross electricity generation and auxiliary consumption are also measured continuously using energy meter at individual plant and recorded hourly in log sheets.

During the on site audit, it was observed that project proponent has been measuring gross energy generation, auxiliary energy consumption, energy exported and energy imported as defined in the monitoring plan of registered PDD however, separate data for gross generation, auxiliary consumption, export and import data for all project sites was not added in the monitoring report. A corrective action was issued to include data separately for gross generation, auxiliary consumption, export and import for all project sites of the project activity. The gross generation, auxiliary consumption, export and import data as per the monitoring plan of the registered PDD has been incorporated in revised monitoring report.

The carbon emission factor is used as a predetermined default value which has been defined in the PDD and confirmed during validation of the project.

Monitoring report did not transparently state if any change in meters has been taken place since initial verification. A corrective action was issued to include a statement about the same. Further, it was observed that energy export for Sidhana plant for the entire monitoring period was zero. A clarification request issued to understand the reason for the same.

3.2.2 Findings

Corrective action request no. 1

As required by the monitoring plan in the registered PDD, the monitoring report should separately report the gross generation, auxiliary consumption, export and import data for all the three project sites. Also, the excel sheet for emission reduction calculations should be provided to the audit team.

Response by project proponent

Necessary corrections have been made in the revised Monitoring Report.

Conclusion by audit team

The gross generation, auxiliary consumption, export and import data as per the monitoring plan of the registered PDD has been incorporated in revised monitoring report. The excel calculation sheet for emission reduction calculation has also been submitted and calculation verified.

Corrective action request no. 2

Please include a statement in monitoring report with respect to any change in meters that has taken place since initial verification.

Response by project proponent

Necessary corrections have been made in the revised Monitoring Report.

Conclusion by audit team

No meter has been changed in the project activity sites since initial verification period. A statement has been included for the same in the revised monitoring report by the project proponent.

Clarification request no. 1

Please clarify why carbon emission reduction of Sidhana unit is not in line with registered PDD. Kindly submit revised schedule for the commissioning of this plant.

Response by project proponent

The carbon emission reduction of MHP Sidhana unit is not in line of registered PDD as MHP Sidhana was under construction during the monitoring period and was not commissioned due to un-availability of Canal Closure for completing the In-canal works and additional time-period required for the strengthening / raising of canal banks and remodeling of one village road bridge and one foot road bridge and has now been commissioned on 25th October 2007. Necessary corrections have been made in the revised Monitoring Report.

Conclusion by audit team

Due to delay in plant commissioning, energy exported to grid by Sidhana unit is zero for the entire monitoring period. It has been informed to audit team that Sidhana unit has been commissioned on 25 October 2007.

3.2.3 Conclusion

Necessary corrections have been incorporated in the revised monitoring report. Hence, the project complies with the requirements.

3.3 Accuracy of Emission Reduction Calculations

3.3.1 Discussion

The accuracy of emission reduction calculation depends on two main factors: the accuracy of the metering equipment on the one hand, and the correct calculation of the emission reductions on the other. The registered PDD states that the energy meters for measuring the electricity exported and imported by the project activity would be checked for accuracy every six months. However, the meters at Lohgarh have not been checked for accuracy during 13 month monitoring period and meters at Chakbhai have been checked only once during 13 month monitoring period. The project at third site viz. Sidhana has not been commissioned during current monitoring period. Request for deviation with respect to frequency of accuracy check of energy meters was submitted to CDM EB (<http://cdm.unfccc.int/UserManagement/FileStorage/66Q9K4AGPKO6MT4DK6GUEK53Z0U8HM>). Based on the request for deviation recommendation by CDM EB on calibration frequency issue of main and check meters (http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_J359UPI4G71PM1QMIVS81FHIJJKYFE) for Lohgarh and Chakbhai, a correction based on the maximum inaccuracy specification of the meters i.e. (\pm) 0.5% for export and import energy units has been applied. The total energy export for the monitoring period has been reduced by 0.5% whereas the total energy import has been increased by 0.5%. Same calculation is also transparently defined in the revised monitoring report. The specifications of main and check meters indicating the maximum inaccuracy of the meters have been submitted to the audit team.

The energy export and import data was verified by cross-checking with monthly joint metering reports and invoices raised for each month and found to be accurate.

The second factor contributing towards accurate emission reduction calculations is the method of calculation itself. The calculation is based on product of net energy exported to grid and grid emission factor. The grid emission factor is used as a predetermined default value which has been defined in the PDD and confirmed during validation of the project. The net energy exported is based on difference of adjusted energy export and import.

3.3.2 Findings

Clarification request no. 2

Please clarify why the energy export and import meters at Lohgarh and Chakbhai have not been checked for accuracy as per 6 month frequency stated in registered PDD.

Response by project proponent

MHP Lohgarh has started generation in October 2005 and the calibrated energy meters (main and check meter) were installed at grid sub-station for measuring the amount of energy exported and imported. The meters at Lohgarh were again checked for accuracy during June 2007 by Punjab State Electricity Board, Government of Punjab and were found to be within acceptable limits of accuracy.

Energy meters at Chakbhai were checked for accuracy by the Punjab State Electricity Board, Government of Punjab (the energy off-taker) during May 2005. During this check in May 2005 the meters were found to be within acceptable limits of accuracy. The meters were again checked for accuracy during February 2007 by Punjab State Electricity Board, Government of Punjab and were found to be within acceptable limits of accuracy.

Also, during monthly joint meter reading of energy export and energy import by the project activity, the comparison of main meter readings and check meter readings take place. During the entire monitoring period the readings of the main meter and check meter were found comparable at both sites. In this respect, we had submitted our request for deviation to EB in respect to the frequency of accuracy check of energy meter. As per the EB guidance, (http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_J359UPI4G71PM1QMIVS81FHIEJKYFE), we have applied a deduction based on the maximum inaccuracy specification of the meters i.e. 0.5%. Necessary corrections to that effect have been made in the revised Monitoring Report. Necessary corrections in respect to the date of calibration have been made in the revised Monitoring Report.

Conclusion by audit team

Based on the request for deviation recommendation by CDM EB on calibration frequency issue of main and check meters for Lohgarh and Chakbhai sites, a correction based on the maximum inaccuracy specification of the meters i.e. (\pm) 0.5% for export and import energy units has been applied. The total energy export for the monitoring period has been reduced by 0.5% whereas the total energy import has been increased by 0.5%. Same calculation is also transparently defined in the revised monitoring report. Along with this the project proponent also submitted the specification of main and check meters for verifying the maximum inaccuracy level of meters.

Forward action request no. 1

The energy export and import meters should be checked for accuracy every six month as stated in registered PDD.

Response by project proponent

The requirement will be met in future

3.3.3 Conclusion

The project complies with the requirements.

3.4 Quality of Evidence to Determine Emission Reductions

3.4.1 Discussion

The critical parameter for the determination of GHG emissions is the net amount of electricity exported to grid, which is based on electricity exported and imported. The audit team did verify the following parameters:

- Energy export and import through joint meter recording sheets for each month and invoices raised for each month
- Gross energy generation and auxiliary consumption measured at plant and recorded in log sheets

All data in the monitoring report is in compliance with the data verified at site.

3.4.2 Findings

None.

3.4.3 Conclusion

The project complies with the requirements.

3.5 Management System and Quality Assurance

3.5.1 Discussion

No CDM specific internal audits are required as such because the monitoring and measurement of power exports and imports are done diligently every month as core business of the company and hence a permanent control of the figures in joint meter readings as well as invoices raised takes place.

Quality assurance procedures are in place as for example the joint meter reports and respective billings are reviewed for accuracy and correctness by a staff member before submission. Staff is made aware of the quality assurance procedures.

All data is transferred to the head office at Noida, India on monthly basis and kept protected. The IT system is based on standard PC and MS-office solutions. The verification team feels confident about its use.

3.5.2 Findings

None

3.5.3 Conclusion

The project complies with the requirements.

4 PROJECT SCORECARD

Risk Areas		Conclusions			Summary of findings and comments
		Baseline Emissions	Project Emissions	Emission Reductions	
Completeness	Source coverage/ boundary definition	✓	✓	✓	All relevant sources are covered by the monitoring plan and the boundaries of the project are defined correctly and transparently.
Accuracy	Physical Measurement and Analysis	✓	✓	✓	The data is accurately measured and presented in transparent manner. CAR 1 and CAR 2 are resolved.
	Data calculations	✓	✓	✓	Emission reductions are calculated correctly. CR1 and CR2 are resolved.
	Data management & reporting	✓	✓	✓	A data management system is in place.
Consistency	Changes in the project	-	-	-	There are no changes in the project to date.

5 VERIFICATION STATEMENT

TÜV SÜD Industrie Service GmbH has performed a verification of the CDM project: “Lohgarh, Chakbhai and Sidhana Mini Hydroelectric Projects”. The verification is based on the currently valid documentation of the UN Framework Convention on Climate Change (UNFCCC). In this context, the relevant documents are the “Marrakech Accords”.

The management of Aqua Power Limited is responsible for the preparation of the GHG emissions data and the reported GHG emissions reductions of the “Lohgarh, Chakbhai and Sidhana Mini Hydroelectric Projects” on the basis set out within the project Monitoring and Verification Plan indicated in the final PDD version, which was registered. The development and maintenance of records and reporting procedures in accordance with that plan, including the calculation and determination of GHG emission reductions from the project is the responsibility of the management of the project.

The verifier confirms that the project is operated as planned and described in validated and registered project design documents except one unit at Sidhana, which is not commissioned yet. Installed equipment being essential for generating emission reduction runs reliably. The monitoring system is in place and the project is generating GHG emission reductions.

The verifier confirms that monitoring plan of project activity is in accordance with applied methodology AMS I.D, version 7. The verifier can confirm that the GHG emission reduction is calculated without material misstatements. Our opinion relates to the project’s GHG emissions and resulting GHG emissions reductions reported and related to the valid and registered project baseline and monitoring, and its associated documents. Based on the information we have seen and evaluated we confirm the following statement:

Reporting period: From 01-04-2006 to 30-04-2007

Verified emission in the above reporting period:

Baseline emissions:	22 658	t CO ₂ equivalents
Project emissions:	0	t CO ₂ equivalents
Emission reductions:	22 658	t CO ₂ equivalents

Munich, 12-03-2008



Javier Castro

**Deputy head of certification
body “climate and energy”**


Munich, 12-03-2008



Abhishek Goyal

Assessment Team Leader


Annex 1: Verification Protocol

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PERIODIC VERIFICATION CHECKLIST

Table 1: Data Management System/Controls


Expectations for GHG data management system/controls	Score	Verifiers Comments (including <i>Forward Action Requests</i>)
1. Defined organizational structure, responsibilities and competencies		
1.1 Position and roles	Full	<p>The overall authority of the project is personally supervised by Mr. Amit Modi (Managing Director). Mr. Amit Modi has further selected Mr. S.D.Kamath (Project Manager), who is an electrical engineer to carry out this activity. Mr. S.D.Kamath is assisted by Mr. Anil Jagga (Maintenance Executive) and 1 Shift Supervisor and 1 Technical assistants (for each site – Lohgarh and Chakbhai)</p> <p>Mr. Anil Jagga is an engineer who prepares the report and the same is countersigned & verified. Mr. Anil Jagga is a graduate electrical engineer (BE Electrical) trained in operation and maintenance of the plant and academically qualified to carry out the task.</p> <p>The allocation of responsibilities is documented in a written form.</p>
1.2 Responsibilities	Full	The responsibilities are clearly defined as detailed in section 1.1 above.

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Expectations for GHG data management system/controls	Score	Verifiers Comments (including <i>Forward Action Requests</i>)
1.3 Competencies needed	Full	As the project employs qualified and trained engineers, all competencies needed meet the requirements, including that of operating personnel.
2. Conformance with monitoring plan		
2.1 Reporting procedures	Partial	<p>Export and import readings are jointly recorded in the monthly joint metering report and net electrical energy content exported to the grid is invoiced. This parameter is most significant to determine the emission reductions from the project activity. Gross electricity generation and auxiliary consumption are also measured continuously using energy meter at individual plant and recorded hourly in log sheets.</p> <p>However, the reporting procedures do not completely reflect the monitoring plan.</p> <p><u>Corrective Action Request No.1.</u></p> <p>As required by the monitoring plan in the registered PDD, the monitoring report should separately report the gross generation, auxiliary consumption, export and import data for all the three project sites. Also, the excel sheet for emission reduction calculations should be provided to the audit team.</p> <p><u>Clarification Request No. 1.</u></p> <p>Please clarify why carbon emission reduction of Sidhana unit is not in line with registered PDD. Kindly submit revised schedule for the commissioning of this plant.</p>

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Expectations for GHG data management system/controls	Score	Verifiers Comments (including <i>Forward Action Requests</i>)
2.2 Necessary Changes	Full	No change is required in the Monitoring Plan.
3. Application of GHG determination methods		
3.1 Methods used	Full	The calculation procedures reflect the monitoring plan content. Export and import readings are jointly recorded in the joint metering report and net electrical energy content exported to the grid is invoiced. This parameter is most significant to determine the emission reductions from the project activity.
3.2 Information/process flow	Full	The necessary procedures have been defined in the power purchase agreement and additional internal documents relevant for the determination of the net electricity exported to the grid.
3.3 Data transfer	Full	See Chapter 3.2
3.4 Data trails	Full	See Chapter 3.2
4. Identification and maintenance of key process parameters		

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Expectations for GHG data management system/controls	Score	Verifiers Comments (including <i>Forward Action Requests</i>)
4.1 Identification of key parameters	Full	The critical parameter for the determination of GHG emissions is the net amount of electricity exported to grid, which is based on electricity exported and imported.
4.2 Calibration/maintenance	Partial	<p>The registered PDD states that the energy meters for measuring the electricity exported and imported by the project activity would be checked for accuracy every six months. However, the meters at Lohgarh have not been checked for accuracy only during 13 month monitoring period and meters at Chakbhai have been checked only once during 13 month monitoring period. The project at third site viz. Sidhana has not been commissioned yet.</p> <p><u>Corrective Action Request No.2.</u> Please include a statement in monitoring report with respect to any change in meters that has taken place since initial verification.</p> <p><u>Clarification Request No. 2.</u> Please clarify why the energy export and import meters at Lohgarh and Chakbhai have not been checked for accuracy as per 6 month frequency stated in registered PDD.</p> <p><u>Forward Action Request No.1</u> The energy export and import meters should be checked for accuracy every six month as stated in registered PDD.</p>
5. GHG Calculations		

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Expectations for GHG data management system/controls	Score	Verifiers Comments (including <i>Forward Action Requests</i>)
5.1 Use of estimates and default data	Full	The carbon emission factor is used as a predetermined default value, which has been defined in the PDD and confirmed during validation of the project.
5.2 Guidance on checks and reviews	Full	<p>No CDM specific internal audits are required as such because the monitoring and measurement of power exports and imports are done diligently every month as core business of the company, and hence a permanent control of the figures in joint meter readings as well as invoices raised takes place.</p> <p>Quality assurance procedures are in place as for example the joint meter reports and respective billings are reviewed for accuracy and correctness by a staff member before submission. Staffs are made aware of the quality assurance procedures.</p>

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Expectations for GHG data management system/controls	Score	Verifiers Comments (including <i>Forward Action Requests</i>)
5.3 Internal validation and verification	Full	<p>No CDM specific internal audits are required as such because the monitoring and measurement of power exports and imports are done diligently every month as core business of the company and hence a permanent control of the figures in joint meter readings as well as invoices raised takes place.</p> <p>Quality assurance procedures are in place as for example the joint meter reports and respective billings are reviewed for accuracy and correctness by a staff member before submission. Staff is made aware of the quality assurance procedures.</p> <p>The audit team did verify the following parameters:</p> <ul style="list-style-type: none"> • Energy export and import through joint meter recording sheets for each month and invoices raised for each month • Gross energy generation and auxiliary energy consumption measured at plant and recorded in log sheets <p>All data is in compliance with the figures stated in the monitoring report.</p>
5.4 Data protection measures	Full	<p>The key parameters are measured by calibrated meter.</p> <p>All the data is transferred to Head Office at Noida, India, on monthly basis and kept protected.</p>

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Expectations for GHG data management system/controls	Score	Verifiers Comments (including <i>Forward Action Requests</i>)
5.5 IT systems	Full	The IT system is based on standard PC and MS-office solutions. Hence the verification team feels confident about its use.



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Table 2: GHG calculation procedures and management control testing

Identification of potential reporting risk	Identification, assessment and testing of management controls	Areas of residual risks
<p>Potential reporting risks based on an assessment of the emission estimation procedures can be expected to occur in the following fields of action:</p> <p>1. Calculation methods,</p> <p>Key source data applicable to the project assessed are hereby:</p> <ul style="list-style-type: none"> • Joint meter reading records • Accounting records (from invoices raised for net electricity export), <p>Appropriate calibration and maintenance of equipment resulting in a high accuracy of data supplied should be in place.</p> <p>It is hereby needed to focus on those risks that impact the accuracy, completeness and consistency of the reported data. Risks are weakness in the GHG calculation systems and may include:</p> <ul style="list-style-type: none"> ➤ manual transfer of data/manual calculations, ➤ position of metering equipment ➤ unclear origins of data, 	<p>Regarding the potential reporting risks identified in the left column the following mitigation measures have been observed during the document review and the on site mission:</p> <p>Raw data collection:</p> <p>As the project is Hydro power based, the net amount of electricity exported to the grid remains to be the only parameter to be obtained for the GHG calculation.</p> <p>Key source data for this parameter are:</p> <ul style="list-style-type: none"> • Joint meter readings • Invoices <p>The meters are installed in the substation premises and this is a restricted area. The metering panel for the main meters and the check meters are sealed sheet metal enclosures. The meters are of reputed make in India.</p> <p>The allocation of responsibilities is documented in a written form.</p> <p>The necessary procedures have been defined in the power purchase agreement and additional internal documents relevant for the determination of the net electricity exported to the grid.</p>	<p>The issue remaining is whether frequency of accuracy checks of the meters is as per the registered PDD.</p>

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Identification of potential reporting risk	Identification, assessment and testing of management controls	Areas of residual risks
➤ accuracy due to technological limitations,	Calculation methods: The calculation procedures reflect the monitoring plan content.	


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Table 3: Detailed audit testing of residual risk areas and random testing

Areas of residual risks	Additional verification testing performed	Conclusions and Areas Requiring Improvement (including <i>Forward Action Requests</i>)
The issue remaining is whether frequency of accuracy checks of the meters is as per the registered PDD.	There has been a complete check of data transferred from readings and invoices to the calculation tool. There was no error in such transfer.	<p>Having investigated the residual risks, the audit team comes to the following conclusion:</p> <p>Immediate action is needed with respect to the following issues in the monitoring report with reference to the registered PDD.</p> <p><u>Corrective Action Request No.1.</u></p> <p>As required by the monitoring plan in the registered PDD, the monitoring report should separately report the gross generation, auxiliary consumption, export and import data for all the three project sites. Also, the excel sheet for emission reduction calculations should be provided to the audit team.</p> <p><u>Corrective Action Request No.2.</u></p> <p>Please include a statement in monitoring report with respect to any change in meters that has taken place since initial verification.</p> <p><u>Clarification Request No. 1.</u></p> <p>Please clarify why carbon emission reduction of Sidhana unit is not in line with registered PDD. Kindly submit revised schedule for the commissioning of this plant.</p> <p><u>Clarification Request No. 2.</u></p> <p>Please clarify why the energy export and import meters at Lohgarh and Chakbhai have not been checked for accuracy as per 6 month frequency stated in registered PDD.</p>




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Table 4: Compilation of open issues

Draft report corrective and forward action requests by audit team	Summary of project owner response	Audit team conclusion
<p><u>Corrective Action Request No.1.</u></p> <p>As required by the monitoring plan in the registered PDD, the monitoring report should separately report the gross generation, auxiliary consumption, export and import data for all the three project sites. Also, the excel sheet for emission reduction calculations should be provided to the audit team.</p>	Necessary corrections have been made in the revised Monitoring Report. Excel sheet for emission reduction calculations have been provided to the audit team.	<p>☑</p> <p>The gross generation, auxiliary consumption, export and import data as per the monitoring plan of the registered PDD has been incorporated in revised monitoring report. The excel calculation sheet for emission reduction calculation has also been submitted.</p>
<p><u>Corrective Action Request No.2.</u></p> <p>Please include a statement in monitoring report with respect to any change in meters that has taken place since initial verification.</p>	Necessary corrections have been made in the revised Monitoring Report.	<p>☑</p> <p>No meter has been changed in the project activity sites since initial verification period. A statement has been included for the same in the revised monitoring report by the project proponent</p>
<p><u>Clarification Request No. 1.</u></p> <p>Please clarify why carbon emission reduction of Sidhana unit is not in line with registered PDD. Kindly submit revised schedule for the commissioning of this plant.</p>	The carbon emission reduction of MHP Sidhana unit is not in line of registered PDD as MHP Sidhana was under construction during the monitoring period and was not commissioned due to unavailability of Canal Closure for completing the In-canal works and additional time-period required	<p>☑</p> <p>Due to delay in plant commissioning, energy exported to grid by Sidhana unit is zero for the entire monitoring period. It has been informed</p>


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Draft report corrective and forward action requests by audit team	Summary of project owner response	Audit team conclusion
	<p>for the strengthening / raising of canal banks and remodeling of one village road bridge and one foot road bridge and has now been commissioned on 25th October 2007.</p> <p>Necessary corrections have been made in the revised Monitoring Report.</p>	<p>to audit team that Sidhana unit has been commissioned on 25 October 2007.</p>
<p><u>Clarification Request No. 2.</u></p> <p>Please clarify why the energy export and import meters at Lohgarh and Chakbhai have not been checked for accuracy as per 6 month frequency stated in registered PDD.</p>	<p>MHP Lohgarh has started generation in October 2005 and the calibrated energy meters (main and check meter) were installed at grid sub-station for measuring the amount of energy exported and imported. The meters at Lohgarh were again checked for accuracy during June 2007 by Punjab State Electricity Board, Government of Punjab and were found to be within acceptable limits of accuracy.</p> <p>Energy meters at Chakbhai were checked for accuracy by the Punjab State Electricity Board, Government of Punjab (the energy off-taker) during May 2005. During this check in May 2005 the meters were found to be within acceptable limits of accuracy. The meters were again checked for accuracy during February 2007 by Punjab State Electricity Board, Government of Punjab and were found to be within acceptable limits of accuracy.</p> <p>Also, during monthly joint meter reading of energy export and energy import by the project activity,</p>	<p>☑</p> <p>Based on the request for deviation recommendation by CDM EB on calibration frequency issue of main and check meters for Lohgarh and Chakbhai sites, a correction based on the maximum inaccuracy specification of the meters i.e. (\pm) 0.5% for export and import energy units has been applied. The total energy export for the monitoring period has been reduced by 0.5% whereas the total energy import has been increased by 0.5%. Same calculation is also transparently defined in the revised monitoring report. Along with this the project proponent also submitted the specification of main and check meters for verifying the maximum inaccuracy level of me-</p>


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Draft report corrective and forward action requests by audit team	Summary of project owner response	Audit team conclusion
	<p>the comparison of main meter readings and check meter readings take place. During the entire monitoring period the readings of the main meter and check meter were found comparable at both sites.</p> <p>In this respect, we had submitted our request for deviation to EB in respect to the frequency of accuracy check of energy meter. As per the EB guidance, http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_J359UPI4G71PM1QMIVS81FHIEJK_YFE, we have applied a deduction based on the maximum inaccuracy specification of the meters i.e. 0.5%. Necessary corrections to that effect have been made in the revised Monitoring Report.</p> <p>Necessary corrections in respect to the date of calibration has been made in the revised Monitoring Report.</p>	ters.
Forward Action Request No.1 The energy export and import meters should be checked for accuracy every six month as stated in registered PDD.	The requirement will be met in future	<input checked="" type="checkbox"/> To be checked during next verification.

Annex 2: Information Reference List

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Reference No.	Document or Type of Information
1	<p>On-site interviews and inspections of the project site were conducted on May 16, 2007 by the auditing team of TÜV SÜD.</p> <p><u>Validation team:</u></p> <p>Mr. Sunil Kathuria Auditor, TÜV SÜD South Asia Mr. Supratik Dutta Trainee Auditor, TÜV SÜD South Asia</p> <p><u>Interviewed persons from Aqua Power Limited:</u></p> <p>Amit Kumar Agarwal Manager-Accounts S.D.Kamadth Project Manager Aqua, Hydro Power Limited (APL) Anil Jagga Maintenance Executive , Aqua Hydro Power Limited (APL)</p>
2	Final Project Design Document for the CDM project "Lohgarh, Chakbhai and Sidhana Mini Hydroelectric Projects" Aqua Power Limited, Punjab, India.
3	Monitoring Report for "Lohgarh, Chakbhai and Sidhana Mini Hydroelectric Projects", Reference no. UNFCCC 0327-CDMP, for the period April 1, 2006 to April 30, 2007, submitted May 2007
4	UNFCCC website, http://www.unfccc.int
5	Joint meter readings and invoices raised , Release of Payment on account of Purchase of Power by (Punjab State Electricity Board) PSEB for the periods April 1,2006 to April 30, 2007, Aqua Power Limited, submitted May 2007
6	Calibration certificate of main meter for Chakbhai by PSEB, dated 24.02.07, submitted May 2007
7	Application for periodical calibration for Lohgarh, submitted May 2007
8	Organisation chart, submitted May 2007
9	Sample of plant outage register of Lohgarh and Chakbhai for the periods April 1, 2006 to April 30, 2007, submitted May 2007
10	Sample copy of logbook for Lohgarh and Chakbhai for the period of April 06 to April 07, submitted May 2007

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Reference No.	Document or Type of Information
11	Sample copy of comparison of main and check meter for Lohgarh and Chakbhai for the period of April 06 to April 07, submitted May 2007
12	Application of renew of water and air consent for Chakbhai, submitted May 2007
13	Photographs of site visit, audit team of TUV SUD South Asia
14	Final version of monitoring report submitted January 2008
15	Request for deviation with respect to frequency of accuracy check of energy meters that was submitted to CDM EB, (http://cdm.unfccc.int/UserManagement/FileStorage/66Q9K4AGPKO6MT4DK6GUEK53Z0U8HM)
16	Recommendation by CDM EB on calibration frequency issue of energy meters, (http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_J359UPI4G71PM1QMIVS81FHIEJKYFE)
17	Final emission reduction calculation excel sheet submitted January 2008