VERIFICATION REPORT

for the CDM Project Activity

Babanpur, Killa and Sahoke Mini Hydroelectric Projects

(UNFCCC Reference No: 0329)

in

INDIA

Report No. 01 997 9105060718

Version 03, 2011-11-28

TÜV Rheinland China Ltd.

I. Project data:

Project title:	Babanpur, Killa and Sahoke Mini Hydroelectric Projects		
Registration number / date:	0329; 30/04/2006		
Monitoring period:	01/04/2010 to 31/07/2011 (both days included)		
Methodology:	AMS-I.D. version 07		
Average emission reductions of eqv Monitoring Period:	Estimated:	30,698 tCO_2e (=23024*16 /12 Months)	Verified: 26,883 tCO_2e
GHG reducing measure/technology:	Supply of renewable electricity to local grid (interconnected with fossil fuel dominated regional grid of India) which is generated at the hydro power plant using potential energy of water flowing through the existing canal system.		

Party	Project participants	Party considered a project participant
India	Kotla Hydro Power Private Limited (KHPPL)	No

II. Verification data:

Contract party:	Kotla Hydro Power Private Limited (KHPPL)
Turn number of periodic verification	5 th periodic verification

Verification team

Role	Full name	Appointed for Sectoral Scopes	Affiliation
Team Leader	Mr. Dinesh Mane (till 08/11/2011) Mr. Sanjay Kumar Agarwalla (from 09/11/2011)	13 1,3, 5,11,12	TÜV Rheinland India Ltd. TÜV Rheinland India Ltd.
Team Members	Mr. Asim Kumar Jana Mr. Sanjay Kumar Agarwalla Mr. Shivraj Sharma	1, 2, 3, 4, 5, 11,12, 13 1,3, 5,11,12 1,3,13	TÜV Rheinland India Ltd. TÜV Rheinland India Ltd. TÜV Rheinland India Ltd.
Technical Reviewer	Dr.Lixin Li	1,3	TÜV Rheinland China Ltd.

III. Verification report data:

Report No.:	Current revision No.:	Date of current revision:	Date of first issue:
01 997 91050560718	**03**	**2011-11-28**	**2011-09-20**

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Final approval:	Released on:	Designated Operational Entity (DOE):
☒	**2011-11-29** **By: Mr. Praveen N. Urs**	**TÜV Rheinland China Ltd.** Unit 707, AVIC Building No: 10B, Central Road, East 3rd Ring Road, Chaoyang District, Beijing 100022, Peoples Republic of china Tel: 0086-10-6566-6667 E-mail: ghg-doe@bj.chn.tuv.com

Abbreviations:

BE	Baseline Emission
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEA	Central Electricity Authority
CL	Clarification Requests
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
DOE	Designated Operational Entity
ER	Emission Reduction
FAR	Forward Action Request
GHG	Green house gas(es)
JMR	Joint Meter Reading
KHPPL	Kotla Hydro Power Private Limited
kWh	Kilo Watt hour
L	Leakage
MMTS	Meter Mobile Testing Squad
MP	Monitoring Plan
MoV	Means of Verification
MR	Monitoring Report
MW	Mega Watt
MWh	Mega Watt hour
N/A	Not Applicable
NABL	National Accreditation Board for Testing and Calibration Laboratories
PDD	Project Design Document
PPA	Power Purchase Agreement
PE	Project Emission
PLF	Plant Load Factor
PP	Project Participant
PSEB	Punjab State Electricity Board
QA/AC	Quality Assurance / Quality Control
TG	Turbo Generator
UNFCCC	United Nations Framework Convention on Climate Change
VVM	Validation Verification Manual

Verification opinion — summary

The verification team assigned by the DOE (TÜV Rheinland China Ltd.) concludes that the CDM Project Activity “Babanpur, Killa and Sahoke Mini Hydroelectric Projects” in India, as described in the registered PDD and monitoring report (version 03, dated 14/10/2011), meets all relevant requirements of the UNFCCC for CDM project activities including article 12 of the Kyoto Protocol, the modalities and procedures for CDM (Marrakesh Accords), simplified modalities and procedures CDM and the subsequent decisions by the COP/MOP and CDM Executive Board.

This verification is carried out as a fifth periodic verification. Rules based approach has been employed to perform this verification. In the course of the verification four (4) Corrective Action Requests (CARs) were raised and successfully closed. No FAR has been raised during this monitoring period. During the last monitoring period, one FAR was raised which has been successfully closed during this verification.

The verification is based on the above mentioned UNFCCC project page documents (validated PDD, Applied methodologies and validation report), monitoring reports, emission reduction calculation spreadsheet, supporting documents made available by the project participant.

The project activity was correctly implemented according to the registered PDD and selected monitoring methodology and monitoring plan. The monitoring equipment was installed, calibrated, and maintained in a proper manner, while collected monitoring data allowed to verify the amount of achieved GHG emission reductions. The DOE is pleased to issue a positive verification opinion expressed in the attached Certification statement.

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1. Introduction

The Kotla Hydro Power Private Limited (KHPPL) has commissioned the DOE TÜV Rheinland China Ltd. to perform the 5th periodic verification of the CDM Project Activity "Babanpur, Killa and Sahoke Mini Hydroelectric Projects" in India (hereafter "project activity" or project). The verifiers have reviewed the GHG data collected for the 5th monitoring period covering 01/04/2010 to 31/07/2011 (including both the days). This report summarises the findings of this verification of the project, performed on the basis of paragraph 62 of the CDM modalities and procedures, as well as criteria given to provide for consistent project operations, monitoring and reporting and the subsequent decisions by the CDM Executive Board. Verification is required for all registered CDM project activities intending to confirm their achieved emission reductions and proceed with request for issuance of CERs.

The 1st, 2nd and 3rd periodic verification were carried out by another DOE (TÜV SÜD Industries Service GmbH (TÜV SÜD)) for the monitoring period covering 01/07/2004 to 31/03/2006 (including both the days), 01/04/2006 to 30/04/2007 (including both the days), 01/05/2007 to 30/06/2008 (including both the days) respectively. Fourth verification was carried out by TUV-Rheinland covering the period from 01/07/2008 to 31/03/2010. There was one FAR raised during the 4th periodic verification and the same was successfully closed during this verification after proper corrective action taken by PP.

1.1 Objective

The purpose of verification is to review the monitoring results and verify that monitoring methodology was implemented according to monitoring plan and monitoring data, used to confirm the reductions in anthropogenic emissions by sources is sufficient, definitive and presented in a concise and transparent manner.

In particular, monitoring plan, monitoring report and the project's compliance with relevant UNFCCC and host Party criteria are verified in order to confirm that the project has been implemented in accordance with previously registered design and conservative assumptions, as documented.

1.2 Scope

The verification of this registered project is based on the validated project design document /B04/, the monitoring reports covering the monitoring period from 01/04/2010 to 31/07/2011 /P01/, /P02/, emission reduction calculation spread sheets /P03/, /P04/, supporting documents made available to the verifier and information collected through performing interviews with stakeholders and during the on-site assessment. Furthermore publicly available information was considered as far as available and required.

On-site visit and stakeholders interviews are also performed on 20/09/2011 as part of this verification process.

2. Methodology

The verification consists of the following four phases:

1. Making the draft monitoring report /P01/ publicly available (http://cdm.unfccc.int/filestorage/P/8/H/P8HSZLOBA2D0J154NX6VCUWF7ERG3M/MR%20%28%230329%2C%205th%20MP%29.pdf?t=NGh8bHI2eDZzfDBvzFbX-ffCYWbNIQHjk_u9);
2. Desk review of the monitoring plan, monitoring report, project design document and other relevant documents;
3. On-site visit (including follow-up interviews with project stakeholders, when deemed necessary) and issuance of draft verification report; and
4. Resolution of outstanding issues and the issuance of the final Verification report and Certification statement.

The following sections outline each step in more detail.

2.1 Desk review

The following tables outline the documentation reviewed during the verification:

Documents provided by the project participant(s):

Reference	Document
/P01/	Draft Monitoring report version 01 (published before commencement of verification), dated 20/08/2011.
/P02/	Final Monitoring report version 03, dated 14/10/2011.
/P03/	Spread sheet corresponding to /P01/.
/P04/	Spread sheet corresponding to /P02/.
/P05/	Calibration certificates for the electricity meters (generation, auxiliary, main and check) used in the project activity covering the monitoring period.
/P06/	Copies of Joint Meter Reading (JMR) reports covering the monitoring period.
/P07/	Copies of monthly Energy Bills covering the monitoring period raised by KHPPL.
/P08/	Sample copies of pages of “daily generation log books” consisting electricity generation, auxiliary consumption meter readings (hourly recording), exported electricity figures and unit wise –day wise running hours recorded at the power house control room.

/P09/	Spreadsheets having calculation of monthly figures of net electricity exported to grid from export and import meter readings from respective monthly JMR reports.
/P10/	Verification contract in between PP and DOE dated 23/08/2011
/P11/	List of all auxiliary drives corresponding to the auxiliary meter.
/P12/	Extract of operation and maintenance record of the hydro turbines.
/P13/	Log of outages including the downtime of the equipments.
/P14/	Single line diagram for electricity and grid connectivity within project boundary.
/P15/	Photographic evidence of grid connectivity, i.e., electricity transmission and evacuation system.
/P16/	Data capturing and QA/QC procedures, roles and responsibilities of the company personnel for the project activity.
/P17/	Proof of training and competency of the project operators.
/P18/	Consent to Operate for period 01/04/2010 to 31/07/2011 from Punjab State Pollution Control Board.
/P19/	Proof of commissioning of the hydro turbines at Babanpur (1 MW) in July 2004, Killa (1.75 MW) in November 2005 and Sahoke (1 MW) in October 2006.
/P20/	Extract of valid Power Purchase Agreement (PPA).
/P21/	Technical specifications of the hydro turbines and generators along with nameplate proof of rated capacities of Babanpur 1 MWe , Killa 1.75 MWe and Sahoke 1 MWe along with overload capacities.
/P22/	Technical specifications of the electricity meters (covering accuracy class, meter standard, model number, calibration frequency, multiplication factor) from respective manufacturers of meters.
/P23/	Proof of approval of multiplication factor of the installed electricity meters.
/P24/	Evidence for change in name of PP from Kotla Hydro Power Limited to Kotla Hydro Power Private Limited.
/P25/	Copy of ISO 9001 certificate.

Background investigation and other referred documents/websites:

Reference	Document
/B01/	Approved CDM Methodology AMS.I.D, version 07: "Grid connected renewable electricity generation".
/B02/	Kyoto Protocol (1997).
/B03/	Decision 3/CMP.1, Decision 4/CMP.1 and Decision 1/CMP.2, paragraph 28.
/B04/	Project Design Document for CDM project: "Babanpur, Killa and Sahoke Mini Hydroelectric Projects", registered on 30/04/2006, UNFCCC project reference number 0329.
/B05/	Validation report for CDM project "Babanpur, Killa and Sahoke Mini Hydroelectric Projects" UNFCCC project reference number 0329.
/B06/	UNFCCC Validation and Verification Manual, version 1.2.
/B07/	E-mail from CDM Secretariat confirming the monitoring report /P01/ made publically available from 29/07/2010.
/B08/	UNFCCC project page of project reference number (0329): http://cdm.unfccc.int/Projects/DB/TUEV-SUED1142616865.86/view
/B09/	Websites referred • http://cdm.unfccc.int/index.html • http://www.cea.nic.in • Directory of Accredited Calibration Laboratories available on website: http://www.nabl-india.org/nabl/asp/users/documentMgmt.asp?cp=4&docType=both • http://www.itouchmap.com/latlong.html

2.2 On-site visit and follow-up interviews with project stakeholders

In order to confirm all physical features of the project activity described in the registered PDD are in place and that the project participant has operated and correctly monitored all parameters of the registered CDM project activity as per the registered PDD, the verification team had carried out this on-visit on 20/09/2011. The action items covered during the site visit include, but are not limited to:

- The on-site assessment included an investigation of whether all relevant equipment is installed and works as anticipated.
- Assessment of any permanent changes in the project activity in comparison with the registered PDD.

- The operating staff was interviewed and observed in order to check the risks of inappropriate operation and data collection procedures.
- Information flows for generating, aggregating and reporting the selected monitored parameters were reviewed.
- The duly calibration of all metering equipment was checked.
- The monitoring processes, routines and documentations were audited to check their proper application.
- The monitoring data were checked completely.
- The data aggregation trails were checked via spot sample down to the level of the meter recordings and original recoded data.
- Identification of QA/QC procedures.

During the visit, a number of identified stakeholders were interviewed. Prior to the visit salient points to be discussed were planned. Date of interview, interviewee and points discussed are given in the following table:

	Date	Name	Organization	Topic
/I-01/	20/09/2011	Mr. Sachin Pahuja	Manager, KHPPL	Plant details and Monitoring Plan Implementation and Management Review Training and competency developments, Assessment of monitoring and QA/QC procedures, Environmental issues.
/I-01/	20/09/2011	Mr. Vishnu Runthla	Accountant, KHPPL	Power plant operation and monitoring of data; Data collection and archiving procedures; Calibration of monitoring instruments; Data trail till the reported values; Outage time analysis; Data archiving and estimation of emission reduction
/I-01/	20/09/2011	Mr. Surinder Singh	Section Head, KHPPL	Plant operation, Data capturing and recording procedure, Plant operation and maintenance

2.3 Resolution of outstanding issues

The objective of this phase of the verification is to resolve any outstanding issues which have to be clarified prior to final DOE's conclusions on the project implementation, monitoring practices and achieved emission reductions. In order to ensure transparency a verification protocol is completed for the project activity. The protocol shows in transparent manner criteria (requirements), means of verification and resulting statements on verification actual project activity against identified criteria.

The verification protocol serves the following purposes:

- It organises in a table form, details and clarifies the requirements, which CDM project is expected to meet;
- It ensures a transparent verification process where the DOE will document how a particular requirement has been verified and the result of the verification.

The verification protocol consists of two tables. Table 1 reflects the verification requirements and reference to the materials used to verify the project activity against those requirements, as well as means of verification. Table 2 reflects the responses provided by the PP (s) including the references of changes in the MR or supporting spreadsheets; the opinion of the DOE on every particular responses. The completed verification protocol for this project is enclosed in Appendix A to this report.

Findings during the verification can be interpreted as a non-compliance with CDM criteria or a risk to the compliance. Corrective action requests (CARs) are raised, in case:

(a) Non-conformities with the monitoring plan or methodology are found in monitoring and reporting, or if the evidence provided to prove conformity is insufficient;

(b) Mistakes have been made in applying assumptions, data or calculations of emission reductions which will impair the estimate of emission reductions;

(c) Issues identified in a FAR during validation to be verified during verification have not been resolved by the project participants.

Requests for clarification (CLs) are raised, if information is insufficient or not clear enough to determine whether the Applicable CDM requirements have been met.

2.4 Internal quality control

The verification report has passed a technical review before being submitted to the project participant(s). The technical review was performed by a technical reviewer qualified in accordance with TÜV Rheinland's qualification scheme for CDM validation and verification.

3. Verification findings

The findings of the verification are described in the following sections. The verification criteria (requirements), the means of verification and the results of validation are documented in detail in the verification protocol in Appendix A.

3.1 Project implementation

3.1.1 The implementation of the project activity

The project activity involved renewable electricity generation by 3.75 MW hydro electric plant of run of the canal type and supply electricity to Punjab State Electricity Board (PSEB) in the Punjab state of India. The project plant consists of three (3) sites viz. Babanpur, Killa and

Sahoke with installed capacities of 3.75 MW (=2 x 500 kW), 1.75 MW (=2 x 875 kW) and 1 MW (=1 x 1000 kW) respectively. The project activity site is located at Kotla Branch Canal in Sangrur district at Punjab, India at three location including Babanpur with Latitude: 30˚24'51(=30.4141˚)N Longitude:75˚52'41(=75.8780˚)E, Killa with Latitude: 30˚19'37(=30.3269˚) N Longitude:75˚43'30(=75.7250˚)E and Sahoke with Latitude: 30˚11'16(=30.1877˚) N Longitude: 75˚34'39(=75.5775˚) E as their GPS coordinates. The same was confirmed during the site visit, document review /B04/ /B05/ and referring to the website 'itouchmap' /B09/ and found to be correct

Electricity generation and supply to NEWNE grid (formerly it was northern regional grid which is now interconnected with NEWNE grid) is enabled through independent transmission lines for the project /P15/. After implementation and commissioning of the project technology, no changes have been carried out or are envisaged. The same has been confirmed from the registered PDD /B04/, on-site visit /I-01/ and past four (4) verification reports available on UNFCCC website /B08/. The outages of project plant due to down times of equipment during this monitoring period was Babanpur: 3154 hrs, Killa : 3155 hrs, Sahoke; 2755 hrs /P13/. The project activity was implemented and operated continuously except for the outage period.

The project has acquired ISO 9001 certificate for all activities related to "generation of electricity using hydel power" on 01/12/2008 which is valid until 01/12/2011 /P25/. This ensures overall data quality management.

The on grid supply of the renewable electricity from project activity results in reduction of GHG emissions by displacing grid power dominated with fossil fuels based electricity generation. The equipment and facilities consisting of generators coupled with vertical full Kaplan turbines, forebay, mechanical intake gates, trash racks, draft tubes, powerhouses with discharge channels and power transformers were verified to be as described in the PDD.

The crediting period start date for the project activity is 01/07/2004 and the commissioning dates for Babanpur, Killa and Sahoke sites are July 2004, November 2005 and October 2006 respectively. Hence the crediting period start date is after the commissioning of one of the project sites. The project activity was implemented and is operational as described in the registered PDD /B04/ and the fourth verification period was over on 31/03/2010. The fifth monitoring period is from 01/04/2010 to 31/07/2011 /P02/. The site specific details are provided in the below table:

Parameter	**Site**		
	Babanpur	**Killa**	**Sahoke**
Rated Power	1 MW (=2x500 kW)	1.75 MW (=2x875 kW)	1 MW (=1x1000 kW)
Turbine Type	2 numbers of vertical semi Kaplan turbine;	2 numbers of vertical full Kaplan turbine;	1 number of vertical full Kaplan turbine;

	Make : HPP Energy India Pvt. Limited	Make : Boving Fouress	Make : Boving Fouress
Generator	2 numbers of synchronous generators; Make : Kirlosker Electricals Co. Ltd.	2 numbers of synchronous generators; Make : Marelli Motori	1 numbers of synchronous generator; Make : Marelli Motori
Generation voltage	415 V	6.6 Kv	6.6 Kv
Step-up voltage	11 kV	11 kV	11 kV

The project activity has been implemented as planned. The commissioning dates of projects, as mentioned in the table above, have been verified to be the commercial power generation dates from the evidences provided by the PP /P19/. The operation of the project activity complies with all statutory requirements /P18/.

The project's emission reductions are determined as the product of the net electricity supplied to the NEWNE grid by the project and the validated ex-ante (fixed as per the validation report section 3.3.1 /B05/) grid emission factor of 0.942 kg of CO_2 /kWh during the crediting period. As the turbines run exclusively with hydro energy without any usage of fossil fuel, there are no project emissions associated with the project. Leakage is considered to be zero as per the applied methodology. The same was also confirmed during on-site visit.

The gross electricity generation from the power plants is measured through the cumulative type online gross generation meters which are installed in the respective power plant control rooms. All the power plant auxiliaries are connected to the respective auxiliary meters as verified from the single line diagram of the electricity system /P22/. Main meters are installed at the respective project sites (after 415 V/11kV transformer for Babanpur site and 6.6 kV/11kV transformer for Killa and Sahoke sites) for measuring the export and import electricity, the difference of which gives net electricity supplied to the grid. Check meters are installed at the respective PSEB sub stations of the projects. The Joint Meter Readings (JMRs) /P06/ are recorded once in the first week of every month, jointly by the representatives of PSEB and KHPPL for all the three sites separately. Main meters are the basis for billing and emission reduction calculation purpose as per the registered PDD.

During on-site visit, verification team verified the actual implementation of the project as described in the PDD and detailed verification of all data contained in the monitoring report was performed. The instruments for measuring electricity (gross electricity generation, auxiliary consumption and export and import electricity meters) and the calibration records /P05/ for these meters were checked and found to be in accordance with the registered monitoring plan of the PDD and are periodically calibrated /P05/ by authorised agencies.

Data variables that are most directly related to the emission reductions (i.e. electricity export and import figures) are measured continuously and data element that is generally constant and indirectly related to the emission reductions (i.e. grid emission factor) has been determined and fixed ex-ante for the whole crediting period, thereby complying the requirements of para 17 (b) of "General guidelines to SSC CDM methodologies", version 17. The plant outages have been recorded and verified to be correctly reported for this monitoring period.

The whole calculation of emission reductions are found correct and having no material misstatement. The net saleable energy values reported in the MR /P02/, included in the CER spread sheet /P04/, the compiled data of daily recording at project site /P08/, the figures in JMRs /P06/ and energy bills /P07/ are found internally and mutually consistent.

Based on above assessment, verification team confirms that no change in the project design has happened during the implementation and operation of the project activity. This also confirms to §178 (a) and §178(c) of VVM.

In accordance with § 182 of VVM the verification team reviewed the registered PDD, including the monitoring plan and the corresponding validation report, previous verification reports, the applied monitoring methodology, relevant decisions from the CMP and the CDM EB and found that the MR for this monitoring period is line with all the above mentioned documents.

Nevertheless, CAR-01 and CAR-02 were raised and successfully closed (refer Table 2 for more details).

3.1.2 The actual operation of the CDM project activity

The project activity comprises of operation of three sites i.e., Babanpur - 1 MW, Killa – 1.75 MW and Sahoke 1 MW. The operation of the project activity was verified from the daily log sheets /P08/ and monthly JMRs /P06/. The voltage at the generator terminals is 415 V for Babanpur and 6.6 kV for Killa and Sahoke sites, which is stepped-up to 11 kV to match the nearest PSEB substation voltage level.

During this reported monitoring period the net electricity exported (derived as the difference of metered export and import electricity figures) by the project activity to the grid is 28.539 million kWh. The metering system consists of one main meter and one check meter of same make and specification for continuous two way measurement of export and import electricity. The monthly readings of export and import electricity, from main and check meters in the first week of every month were taken and recorded in the JMRs, which are certified by PSEB. The corresponding electricity figures (in kWh) are calculated by multiplying the multiplication factor with the meter reading difference. These net electricity figures derived from main meter

readings (in JMRs) are used as basis for preparation of energy bills and as well as for CER calculation. The project's emission reductions are determined as the product of the net electricity supplied to the NEWNE grid by the project and the validated ex-ante (fixed as per the validation report) grid emission coefficient of 0.942 kg CO_2 per kWh during the crediting period.

The verification team confirms that the project implementation including the actual project activity and its operation is as per the PDD /B04/ thus satisfying the requirement of para 195 of VVM.

3.1.3 The assessment of the impact of change in project design

As described in the section 3.1.1 and 3.1.2 of this report above, the project activity has been implemented and operated with the physical features as described in the registered PDD. Hence submission of validation opinion / notification of changes along with documentation (in line with Annex-66 and Annex-67 of EB 48) are not sought.

3.2 Compliance of the monitoring plan with the monitoring methodology

The project is grid connected renewable power generation project with installed capacity of 3.75 MW. The monitoring plan and the monitoring system implemented are in compliance to the applied monitoring methodology AMS I.D, version 07.

All other requirements of the applied methodology are met. Furthermore, it can be confirmed that the ex-ante value for grid emission factor (EF) sourced from CEA data base has been correctly applied in the calculation of emission reductions.

3.3 Compliance of the monitoring with PDD and monitoring plan

The submitted revised MR /P02/, which forms the basis of the certification statement, was prepared by summarizing consolidated daily and monthly data over the whole monitoring period in accordance with the monitoring plan of the registered PDD. The monitoring system and all applied procedures are completely in compliance with the registered monitoring plan.

3.3.1 Monitored parameters

During the verification all relevant monitoring parameters (as listed in section D.3 of the PDD) have been verified with regard to the appropriateness of the verification method, the correctness of the values applied for ER calculation, the accuracy and applied QA/QC measures. The results as well as the verification procedure are described parameter-wise in the section 4 of Table 1 of the verification protocol. After appropriate corrections, carried out by the project participant, it is confirmed that all monitoring parameters have been measured / determined without material misstatements and are in line with all applicable standards and relevant requirements.

Particulars of the monitoring parameters	Verifier Comments
Energy Exported: Energy Exported to the grid (Cp ID number 1 of the MP)	"Energy Exported" is the electricity exported to the NEWNE grid for this monitoring period
Data unit – kWh	The unit is as per the registered PDD.
Frequency of recording	Continuous measurement and monthly recording.
Source of data/ means of (cross) verification	Monthly Joint Meter Reading records /P06/ and cross checked with Monthly energy sales bills /P07/.
Reported value in the MR /P02/	28,586,600
Measuring equipment details	Bidirectional Tri -Vector meters of 0.5s accuracy are used for measurement of this parameter. The energy meters are supplied by a reputed manufacturer (L&T) /P22/.
Calibration	The installed energy meters are calibrated every six months by MMTS (MMTS-PSEB), a division of PSEB. PSEB is statutory body under the Indian Electricity Act 1948 and owned by the Government of Punjab and hence deemed to be competent. The calibration certificates are verified and found OK.
QA/QC measures	Power exported by the project, which is data source for CER calculation, is estimated from the monthly reports (=JMRs /P06/). The readings are cross checked with energy bills raised to PSEB for electricity exported to the grid /P07/.

Particulars of the monitoring parameters	Verifier Comments
Energy Imported: Energy Imported from the grid (Cp ID number 2 of the MP)	"Energy Imported" is the electricity imported from the NEWNE grid for this monitoring period.
Data unit – kWh	The unit is as per the registered PDD.
Frequency of recording	Continuous measurement and monthly recording.
Source of data/ means of (cross) verification	Monthly Joint Meter Reading records /P06/ and cross checked with Monthly energy sales bills /P07/.
Reported value in the MR /P02/	47,880
Measuring equipment details	Bidirectional Tri -Vector Meters Tri-vector meters of 0.5s accuracy are used for measurement of this parameter. The energy meters are supplied by a

	reputed manufacturer (L&T) /P22/.
Calibration	The installed energy meters are calibrated every six months by MMTS (MMTS-PSEB), a division of PSEB. PSEB is statutory body under the Indian Electricity Act 1948 and owned by the Government of Punjab and hence deemed to be competent. The calibration certificates are verified and found OK.
QA/QC measures	Power imported by the project, which is data source for CER calculation, is estimated from the monthly reports (=JMRs /P06/). The readings are cross checked with energy bills raised to PSEB for electricity imported from the grid /P07/

Particulars of the monitoring parameters	**Verifier Comments**
Net Saleable Energy: Net saleable energy to the grid (Cp ID number 3 of the MP)	"Net Saleable Energy" is the net electricity exported to the grid by the project activity (=difference of measured values of export and import electricity) for this monitoring period.
Data unit – kWh	The unit is as per the registered PDD.
Frequency of recording	Calculated from monthly recorded export and import values of electricity.
Source of data/ means of (cross) verification	Monthly Joint Meter Reading records /P06/ and cross checked with Monthly energy sales bills /P07/.
Reported value in the /P02/	28,538,720
Measuring equipment details	This value is arrived by deducting the grid electricity import from the grid electricity export.
Calibration	Not Applicable
QA/QC measures	Power exported by the project, which is data source for CER calculation, is taken from the monthly reports (=JMRs /P06/). The readings are cross checked with the monthly energy sales bills /P07/.

Particulars of the monitoring parameters	**Verifier Comments**
Energy Generated: Gross energy generated (Cp ID number 4 of the MP)	"Energy Generated" is the electricity generated by individual turbine.
Data unit – kWh	The unit is as per the registered PDD.
Frequency of recording	Continuous measurement and hourly recording.

<table>
<tr><td>Source of data/ means of (cross) verification</td><td>Daily Log sheet books /P08/.</td></tr>
<tr><td>Reported value in the /P02/</td><td>29,565,828</td></tr>
<tr><td>Measuring equipment details</td><td>
<table>
<tr><th></th><th colspan="2">Babanpur</th><th colspan="2">Killa</th><th>Sahoke</th></tr>
<tr><th></th><th>Unit I</th><th>Unit II</th><th>Unit I</th><th>Unit II</th><th>Unit I</th></tr>
<tr><td>Manufacturer</td><td>Rishabh</td><td>Rishabh</td><td>Minsun</td><td>Tiny Master (Old) / Selec (New)</td><td>Minsun</td></tr>
<tr><td>Accuracy Class</td><td colspan="2">0.5s</td><td>0.5s</td><td>0.5s (Old) / 1s (New)</td><td>0.5s</td></tr>
</table>

Details service period of old and new Killa unit II Meter for the above generation meters are as follows:-
<table>
<tr><td>Meter Sr. No.</td><td>Service period</td></tr>
<tr><td>23653 TMD 107</td><td>01/04/2010 to 27/12/2011</td></tr>
<tr><td>B : 0910</td><td>28/12/2011 to 31/07/2011</td></tr>
</table>
</td></tr>
<tr><td>Calibration</td><td>The installed energy meters are calibrated every six months by Balaji Control / Nano Technical Services/ Advance Control System, who are accredited and registered by National Accreditation Board for Testing and Calibration Laboratories (NABL), Govt. of India, to do the calibration of energy and hence deemed to be competent. The calibration certificates are verified and found OK.</td></tr>
<tr><td>QA/QC measures</td><td>Gross energy generation meter readings are recorded by the shift supervisor in the daily log sheets which are counter signed by the plant site supervisor /P08/.</td></tr>
</table>

Particulars of the monitoring parameters	**Verifier Comments**
Auxiliary Energy consumption: Auxiliary Energy consumption	**"**Auxiliary Energy consumption**"** is the energy-electricity consumed by the plant machinery in order to operate the plant.
Data unit – kWh (Cp ID number 5 of the MP)	The unit is as per the registered PDD.
Frequency of recording	Continuous measurement and hourly recording.

<table>
<tr><td>Source of data/ means of (cross) verification</td><td>Daily Log sheet books /P08/.</td></tr>
<tr><td>Reported value in the /P02/</td><td>300,380</td></tr>
<tr><td>Measuring equipment details</td><td>
<table>
<tr><th></th><th>Babanpur</th><th>Killa</th><th>Sahoke</th></tr>
<tr><td>Manufacturer</td><td>Rishabh</td><td>Enercon</td><td>Enercon (Old) / Selec (New)</td></tr>
<tr><td>Accuracy Class</td><td>0.5s</td><td>0.5s</td><td>0.5 (Old) / 1s (New)</td></tr>
</table>
Details service period of old and new Sahoke Meter for the above generation meters are as follows:-
<table>
<tr><td>Meter Sr. No.</td><td>Service period</td></tr>
<tr><td>54706/977-3004</td><td>01/04/2010 to 27/12/2011</td></tr>
<tr><td>B : 0910</td><td>28/12/2011 to 31/07/2011</td></tr>
</table>
</td></tr>
<tr><td>Calibration</td><td>The installed energy meters are calibrated every six months by Balaji Control / Nano Technical Services/ Advance Control System, who are accredited and registered by National Accreditation Board for Testing and Calibration Laboratories (NABL), Govt. of India, to do the calibration of energy meters and hence deemed to be competent. The calibration certificates are verified and found OK.</td></tr>
<tr><td>QA/QC measures</td><td>Auxiliary energy consumption meter readings are recorded by the shift supervisor in the daily log sheet which is counter signed by the plant site supervisor /P08/.</td></tr>
</table>

The grid emission factor (EF_y) is determined ex-ante and considered as fixed for the crediting period. Its value is as tabulated below:

Parameter	Value	Reference
Grid Emission Factor (EF_y) for the Northern Regional Grid	0.942 kg CO_2/kWh	Validation Report /B05/

3.3.2 Information flow

As required by § 206 of VVM, verification team has checked information flow (from data generation, aggregation, to recording, calculation and reporting) for each parameter including the values used for the emission reduction calculation from the project which is mentioned below:

Gross electricity generation: Energy generation by individual turbine is measured by the energy meters /P22/ (digital meter for corresponding generator) continuously. Hourly readings (in MWh) are noted down by the Plant Shift Supervisor in the daily log sheet book /P08/.

Auxiliary electricity consumption: Each site has one auxiliary meter /P22/ which continuously monitors the electricity consumption in the plant by auxiliary components. The auxiliary consumption is recorded hourly by the Shift Supervisor in the daily log sheet book /P08/. Hourly readings are aggregated to give daily auxiliary consumption.

Export / Import electricity: Each site has one main meter installed /P22/ (after step-up transformer) by PSEB to measure export and import of electricity by the plant on continuous basis. In the first week of every month (on a suitable date to the PP and PSEB), Joint Meter Readings (for export and import electricity) are recorded /P06/ (i.e. previous months opening reading and current month closing reading). The Joint Meters Readings are signed by PP, and representatives from PSEB /P06/. The difference of export and import of electricity is the net electricity supplied to the grid for the respective month and this is the basis for raising invoice to PSEB by PP /P07/ and also for the ER calculations /P04/.

Please refer to section 3.1.2, 3.3.1 and table 1(section 4) of the report for further details. The verification team hereby confirms that there is no material misstatement in the calculation of reported emission reductions.

For the assessment of data and calculation of greenhouse gas emission reductions, section 3.4 of this report can be referred.

3.3.3 Monitoring responsibility

The shift supervisor is responsible for the data recording and maintains the daily recorded data. The plant shift supervisor verifies the recorded data and counter signs the same. The recoded data flows through the assistant plant manager to plant manager to general manager and finally to the managing director. JMRs are generated based on the monthly electricity export and import. Finance department confirms the data from the data received from the plant.

The monitoring personnel of KHPPL are well trained and have the necessary competence to carry out the relevant tasks with sufficient accuracy. Based on the data recording procedures

and on-site visit, it is confirmed that the management system for monitoring plan of the CDM All data have been measured as specified in the PDD and the measured instruments are calibrated as scheduled and thus DOE concludes that the uncertainty level is low.

3.3.4 Accuracy of measuring equipment

Details of the main meters, energy generation meters and auxiliary meters in service during this monitoring period, for all three sites with respect to manufacturer, model, meter serial number and accuracy class is provided in the table below:

	Babanpur		Killa		Sahoke
	Unit I	**Unit II**	**Unit I**	**Unit II**	**Unit I**
Main meter					
Manufacturer	Larson & Tubro		Larson & Tubro		Larson & Tubro
Model	ER 300P		ER 300P		ER 300P
Meter Serial Number	05271088		04223074		04223078
Accuracy Class	0.5s		0.5s		0.5s
Calibration Frequency	6 Months		6 Months		6 Months
Date of calibration	25/02/2010 23/08/2010 18/02/2011 26/07/2011		25/02/2010 24/08/2010 16/02/2011 26/07/2011		25/02/2010 24/08/2010 16/02/2011 01/08/2011
Energy Generation Meter					
Manufacturer	Rishabh	Rishabh	Minsun	Tiny Master (Old) / Selec (New)	Minsun
Model	Rish Integra 2000	Rish Integra 2000	MSDP-882-332	El Measure TM7400 (Old) / MFM 383-C (New)	MSDP-882-332
Meter Serial Number	04/12/2288	. 05/09/4126	6851019	23653 TMD 107 (Old) / B : 0910 (New)	68B0511
Accuracy Class	0.5s	0.5s	0.5s	0.5s (Old) / 1s (New)	0.5s
Calibration Frequency	6 Months	6 Months	6 Months	6 Months	6 Months
Date of calibration	31/12/2009 29/06/2010 28/12/2010 26/06/2011	31/12/2009 29/06/2010 28/12/2010 26/06/2011	01/01/2010 29/06/2010 28/12/2010 26/06/2011	For Old Meter: Sl. No. 23653 TMD 107; (in service from prior to the start date of this monitoring period - 01/04/2010 to 28/12/2010) 01/01/2010	01/01/2010 29/06/2010 28/12/2010 26/06/2011

				29/06/2010 28/12/2010 (For New Meter - Sl. No. B : 0910; in service from 28/12/2010 to 31/07/2011) 28/12/2010 26/06/2011	
Auxiliary Meter					
Manufacturer	Rishabh		Enercon		Enercon (Old) / Selec (New)
Model	Rish Master 3430		EM 6400		EM 6400 (Old) / MFM 383 C (New)
Meter Serial Number	Sl. No. 08/06/0915		57343/1598-3804		54706/977-3004 (Old) / B:0911 (New) (replaced on 28/12/2010
Accuracy Class	0.5s		0.5s		0.5s (Old)/1s (New)
Calibration Frequency	6 Months		6 Months		6 Months
Period of calibration	31/12/2009 29/06/2010 28/12/2010 26/06/2011		01/01/2010 29/06/2010 28/12/2010 26/06/2011		For Old Meter: Sl. No. 54706/977-3004; (in service from prior to the start date of this monitoring period - 01/04/2010 to 28/12/2010) 01/01/2010 29/06/2010 28/12/2010 (For New Meter - Sl. No. B : 0911; in service from 28/12/2010 to

			31/07/2011) 28/12/2010 26/06/2011

The calibration certificates of the energy meters used during this monitoring period were verified during the on-site visit. The verifying team confirms that the electricity meters confirm to national standards and are (re)calibrated according to the national standards at the intervals (< 3 years), thereby complying the requirements of paragraph 17 (c) of “General guidelines to SSC CDM methodologies”, version 17. However, the gross generation meter (for Unit-II) at Killa site was changed on 28/12/2010 (i.e. from Old Meter: Sl. No. 23653 TMD 107 to New Meter: Sl. No. B : 0910), Also the auxiliary meter at Sahoke site was changed on 28/12/2010 (i.e. from Old Meter: Sl. No. 54706/977-3004 to New Meter: Sl. No. B/0911). The same was verified by verification team during on-site visit document review /P05/

Nevertheless, CAR-03 was raised and successfully closed (refer to Table 2 for details).

3.3.5 Deviation from and Revision of the registered monitoring plan

As the registered monitoring plan is in accordance with the approved monitoring methodology; the actual monitoring systems and procedures comply with the monitoring plan; data for all monitoring parameters are available and reported; (Cp § 206 of VVM); no delayed installation / operation of monitoring equipment is observed (Cp para 57 of EB 43); the need of requesting deviation or revision of MP is not sought.

3.4 Assessment of data and calculation of greenhouse gas emission reductions

The calculations and applied formulae and method for calculation of baseline emission are in accordance with the registered monitoring plan and are in line with the requirements of the applied methodology (AMS I.D, Version 07). The formulae and the methods referred in the MR and the spread sheet for estimation of emission reduction comply with the methods described in the registered PDD (section E).

The calculation of emission reductions is based on subtracting project emissions and leakage from the baseline emissions. As the turbines run exclusively with hydro energy without any usage of fossil fuel, the project emissions are considered as zero. Leakage is considered to be zero as per applied methodology and PDD /B04/. For the calculation of baseline emissions the ex-ante and validated fixed value of baseline parameters, i.e. Northern Regional Grid Emission Factor (subsequently amalgamated to NEWNE grid) is taken into account.

Baseline Emissions:

The formula used for the determination of baseline emissions which is line with the PDD section E:

Baseline Emissions (tCO_2/yr) = Emission Coefficient (EFy) (kg CO_2/kWh) X Net Saleable Energy (kWh) / 1000

The grid emission factor is taken as 0.942 kg CO_2/kWh as per the value mentioned in section B.5 of registered PDD (Cp. Page 20).

The net electricity exported to the grid for the period 01/04/2010 to 31/07/2011, (both days included) is 28,538,720 kWh.

The calibration reports /P05/ covering this monitoring period of all the meters, the JMR /P06/ for the monitoring period and the emission reduction spreadsheet /P04/ have been verified and found to be OK.

Project Emissions:

As the turbines run exclusively with hydro potential without any usage of fossil fuel, the project emissions are considered as zero.

Leakage:

In accordance with AMS I.D. version 7 para 8, as no transfer of equipment has been carried out in the project, no leakage estimation is required.

An ER calculation was prepared by the PP and presented to the verification team /P02/. It is confirmed that the ER calculation is overall correct. The total emission reductions during the monitoring period are 26,883 tCO_2e.

No significant reporting risks have been identified for the data reported. The operational procedures for training, emergency preparedness, maintenance and calibration of monitoring equipments, monitoring measurements and reporting, record handling and maintenance, reviewing monitored data, project performance reviews and corrective actions are available at the plant. All the monitored data are archived in electronic form. The data will be kept for the whole crediting period and additional 2 years thereby meeting the requirement of the PDD and also complying the requirements of para 17 (a) of “General guidelines to SSC CDM methodologies”.

Nevertheless, CAR-04 was raised and successfully closed (refer Table 2 for more details).

Verified emission in this monitoring period:

Project emissions 00 tCO_2 equivalents

Baseline emissions 26,883 tCO_2 equivalents

Emission reductions 26,883 tCO_2 equivalents.

3.5 Issues remaining from the validation and previous verification period (s)

All raised CARs and CLs were successfully closed during the previous verifications and validation of the project design. The verification has been carried out based on the previous verifications, final registered PDD and CDM-UNFCCC Project registration page /B08/.

Consideration of FAR-01, raised by the DOE during the 4th periodic verification:

FAR-01			
Findings	**Initial Response (as per previous verification report)**	**Evidence of Compliance**	**Conclusion**
In context of CL-03, PP needs to improve the QA/QC procedures on data management to avoid potential mistakes of manual data transfer during future verification period.	The same shall be complied-with in future.	PP has further improved the "Data capturing and QA/QC procedures, roles and responsibilities of the company personnel for the project activity" /P16/ for the compliance of the FAR-01.	The amended QA/QC procedures to avoid potential mistakes of manual data transfer during the verification period is found OK and no mistake has been found during this monitoring period. Hence this FAR-01 is closed.

Appendix A

CDM Verification protocol

Babanpur, Killa and Sahoke Mini Hydroelectric Projects

in

INDIA

Report No. 01 997 9105060718

Table 1: Verification requirements (based on §56, §57 and §62 of the CDM Modalities and Procedures and on CDM Validation and Verification Manual, Annex 1 of EB 55)					
Checklist question	**Ref.**	**MoV[1]**	**Findings, comments, References, data sources**	**Draft conclusion**	**Final Conclusion**
1. Implementation					
1.1 Have all physical features proposed in the registered PDD been implemented at the project site?	/P01/ /P21/ /P15/ /P22/ /B04/ /I01/	DR, I	All the physical features (technology, project equipment, grid connectivity and monitoring equipment) mentioned in the registered PDD have been implemented at the project site. This was verified during on-site visit via name plate verification of all equipments. There is no change of project design with respect to registered PDD. However, the title of the project activity as mentioned in the MR does not match with the project page. CAR-01 is raised in this respect and closed after corrections in the MR.	~~CAR-01~~	-
1.2 Has the project activity been operated in accordance with the project scenario described in the registered PDD and relevant guidance? Reference: <http://cdm.unfccc.int/EB/033/eb33rep.pdf>, §75	/P01/ /P02/ /P05/ /P12/ /P22/ /B04/	DR, I	The installed equipments were operated as described in the registered PDD. However, the downtime of the equipment has not been provided in the MR. In this context CAR-02 is raised and successfully closed.	~~CAR-02~~	-

[1] MoV = Means of Verification, DR = Document Review, I = Interview, www = internet search.

1.3 If the project activity is implemented on a number of different locations, has the Monitoring report provided the verifiable starting dates for each site?	/P01/ /P06/ /P07/ /P08/ /B04/ /I-01/	DR, I	The project activity is implemented at three different locations – Babanpur, Killa and Sahoke. The start dates for the monitoring period were verified for each location by verifying JMRs, Energy bills for the respective months and daily generation log books for each location.	OK	-
2. Monitoring plan and methodology					
2.1 Is the monitoring plan established in accordance with the monitoring methodology?	/B01/ /B04/ /B05/	DR	Yes, the monitoring plan as described in section D of the PDD is in accordance with the monitoring methodology.	OK	OK
2.2 In case the implemented monitoring plan differs from the monitoring methodology, has any requests for revision to or deviation from the monitoring methodology been officially communicated to the CDM EB? Reference: <http://cdm.unfccc.int/EB/033/eb33rep.pdf>, §84, §58	/B01/ /B04/ /B05/ /B08/ /B09/	DR	Not applicable.	-	-
2.2.1 Have the above changes to the monitoring plan been approved by the CDM EB?	/B01/ /B04/ /B08/	DR	Not applicable.	-	-
3. Monitoring and the monitoring plan					
3.1 Is monitoring established in full compliance with the monitoring plan, contained in the registered PDD (or new monitoring plan approved by the CDM EB)?	/P01/ /B01/ /B04/ /B05/ /B08/	DR	Yes, the monitoring of the parameters is established in full compliance with the monitoring plan, contained in the registered PDD.	OK	-

3.2 Are all baseline emission parameters monitored and updated in accordance with monitoring plan, monitoring methodology and relevant CDM EB decisions?	/P01/ /B01/ /B04/ /B05/ /B08/ /B09/	DR	The reporting is in line with the requirements of the applied methodology which requires that the net electricity generated by the renewable energy. The electricity parameter of the baseline emission parameters was monitored and updated in accordance with monitoring plan, monitoring methodology and relevant CDM EB decisions. The baseline emissions is the direct product of electricity baseline emission factor and net electricity generated by the project activity which is equal to net power exported by the project activity	OK	-
3.2.1 Was the monitoring equipment for baseline emission parameters controlled and monitoring results recorded as per approved frequency?	/P01/ /P06/ /P07/ /P08/ /P09/ /B04/ /I-01/	DR, I	The main meter is the basis the JMR and invoice to respective JMR is done through the data obtained from these meters. The ER calculations are also done through the received data from these meters. Net Electricity Export readings are recorded in the monthly JMR. The daily electricity generation and auxiliary consumption readings are taken on hourly basis in the daily log sheet book as per the registered monitoring plan which was verified during the site visit by the DoE.	OK	-

3.2.2 Was the monitoring equipment for baseline emission parameters calibrated in accordance with QA&QC procedures described in the registered monitoring plan?	/P01/ /P05/ /B04/ /B08/ /B09/	DR, I	Monitoring equipment are calibrated in accordance with QA/QC procedures described in the registered monitoring plan. However, the calibration dates of the old and new generation meter for Killa site Unit 2 and old and new auxiliary meters for Sahoke site are not explicitly provided in the MR (meters were changed on 28/12/2011). Also the make and accuracy class of the old meters needs to provided. In this context CAR-03 is raised and successfully closed.	~~CAR-03~~	-
3.3 Are all project emission parameters monitored and updated in accordance with monitoring plan, monitoring methodology and relevant CDM EB decisions?	/P01/ /B01/ /B04/ /I-01/	DR, I	No project emissions are projected as per registered PDD and meth. The same was also reconfirmed during the on-site visit.	OK	-
3.3.1 Was the monitoring equipment for project emission parameters controlled and monitoring results recorded as per approved frequency?	-	DR	See above comment	OK	-
3.3.2 Was the monitoring equipment for project emission parameters calibrated in accordance with QA&QC procedures described in the registered monitoring plan?	-	DR	See above comment	OK	-
3.4 Are all leakage emission parameters monitored and updated in accordance with monitoring plan, monitoring methodology and relevant CDM EB decisions?	/P01/ /B01/ /B04/ /I-01/	DR, I	No leakage is projected as per registered PDD and meth. The same was also reconfirmed during the on-site visit.	OK	-
3.4.1 Was the monitoring equipment for leakage emission parameters controlled and monitoring results recorded as per approved frequency?	-	DR	Same as above	OK	-

3.4.2 Was the monitoring equipment for leakage emission parameters calibrated in accordance with QA&QC procedures described in the registered monitoring plan?	-	DR	Same as above	OK	-
3.5 Were all monitoring parameters available and verifiable through the whole monitoring period?	/P01/ /P06/ /P07/ /P08/ /P09/ /P12/ /P13/ /I-01/	DR, I	The daily and monthly electricity generation and auxiliary consumption meter readings are recorded in the daily generation log book at power house. The monthly export and import electricity figures are recorded in the monthly JMR reports prepared by PSEB. The corresponding monthly energy bills confirm the monthly electricity figures in the JMRs. All the electricity meter readings and the electricity figures in the reported monitoring period could be verified through JMRs and invoices raised for the respective JMRs.	OK	-
3.5.1 In case, only partial monitoring data is available and PP(s) provide estimations or assumptions for the rest of data, was it possible to verify those estimations and assumptions? Reference: <http://cdm.unfccc.int/EB/026/eb26rep.pdf>, §109(b)	/P01/ /P06/ /P07/ /P08/ /B04/	DR	Not applicable	--	--
3.6 Was management and operation system established and operated in accordance with the monitoring plan?	/P01/ /P16/ /P17/ /B04/ /I-01/	DR, I	Yes, the management and operation system was established and operated in accordance with the monitoring plan.	OK	-

3.7 Was is it possible to verify that involved management and operation personal is fully aware of the responsibilities and perform all operations according to the registered monitoring plan and internally developed manuals?	/P01/ /P16/ /P17/ /B04/ /I-01/	DR, I	Yes, it was verified that the plant personnel were well aware and competent for operation of the plant and data recording.	OK	-
4. Parameters					
4.1.1 **Monitored parameter** Title: **Grid emission factor for the Northern Regional Grid** Indication: **EF_y** Units: **kg CO_2/ kWh** Estimated value (*ex-ante*): 0.942	/P01/ /B01/ /B04/ /B05/ /B08/ /B09/	DR	This parameter is determined ex-ante as per the registered PDD and used as fixed for the crediting period.	OK	-
4.1.2 **Monitored parameter** Title: **Energy Exported** Indication: **Energy Exported to the grid** Units: **kWh** Reported value (*ex-post*): 28,586,600	/P01/ /P06/ /P07/ /P08/ /B01/ /B04/ /B05/ /B08/ /B09/	DR, I	The electricity exported from the grid is measured by the bi-directional tri-vector energy meter installed at the project site on continuous basis. Once in a month JMR is signed by the representatives of Punjab State Electricity Board (PSEB) and Kotla Hydro Power Private Ltd. The JMRs are monthly statements of the calculated net electricity exported to the grid (= export- import). The measurement method is in accordance with the monitoring plan of the PDD. No deviations from the validated monitoring plan have been identified. Accuracy testing of energy meters are carried out by Mobile Meter Testing Squad (MMTS) of PSEB and all the calibration records were checked and found OK. The values are sufficiently justified as they	OK	-

			are in agreement with the joint meter readings for each month of the monitoring period and sales invoices for the entire monitoring period.		
4.1.3 **Monitored parameter** Title: **Energy Imported** Indication: **Energy imported from the grid** Units: **kWh** Reported value (*ex-post*):47,880	/P01/ /P06/ /P07/ /P08/ /B01/ /B04/ /B05/ /B08/ /B09/	DR, I	The electricity imported from the grid is measured by the bi-directional trivector energy meter installed at the project site on continuous basis. Once in a month JMR is signed by the representatives of Punjab State Electricity Board (PSEB) and Kotla Hydro Power Private Ltd. The measurement method is in accordance with the monitoring plan of the PDD. No deviations from the validated monitoring plan have been identified. Accuracy testing of energy meters are carried out by Mobile Meter Testing Squad (MMTS) of PSEB and all the calibration records were checked and found OK.	OK	-
4.1.4 **Monitored parameter** Title: **Net Saleable Energy** Indication: **Net Saleable Energy to the grid** Units: **kWh** Reported value (*ex-post*): 28,538,720	/P01/ /P06/ /P07/ /P08/ /B01/ /B04/ /B05/ /B08/ /B09/	DR, I	The net saleable electricity is the calculated by subtracting electricity imported from electricity exported for the respective month for each site of the project activity. This monitored value is calculated from the JMR readings and for this value bills are raised to PSEB for the supply of the electricity to the grid. The value of net saleable electricity was cross checked with the bills raised to PSEB and found OK.	OK	-
4.1.5 **Monitored parameter** Title: **Energy Generated**	/P01/ /P06/	DR, I	The electricity generated from the generators is measured by the energy	OK	-

Indication: **Gross energy generated** Units: **kWh** Reported value (*ex-post*): 29,565,828	/P07/ /P08/ /B01/ /B04/ /B05/ /B08/ /B09/		meter installed at the project site on continuous basis. The same is recorded hourly in the daily log sheet book by the technical assistance/ operator. The measurement method is in accordance with the monitoring plan of the PDD. No deviations from the validated monitoring plan have been identified. The values given in the monitoring report and the corresponding Excel sheets are correct. Accuracy testing of energy meters are carried out by Balaji Control / Nano Technical Services/ Advance Control (accredited by NABL) and all the calibration records were checked and found OK.		
4.1.6 **Monitored parameter** Title: **Auxiliary Energy Consumption** Indication: **Auxiliary Energy consumption** Units: **kWh** Reported value (*ex-post*):300,380	/P01/ /P06/ /P07/ /P08/ /B01/ /B04/ /B05/ /B08/ /B09/	DR, I	The electricity consumed in-house from the generated electricity to run the plant auxiliary is measured by the energy meter installed at the project site on continuous basis. The same is recorded hourly in the daily log sheet book by the technical assistance/ operator. The measurement method is in accordance with the monitoring plan of the PDD. No deviations from the validated monitoring plan have been identified. The values given in the monitoring report and the corresponding Excel sheets are correct. Accuracy testing of energy meters are	OK	OK

			carried out by Balaji Control / Nano Technical Services/ Advance Control (accredited by NABL) and all the calibration records were checked and found OK.		
4.2 **Default parameter** Title: Indication: Units: Default/Used value:	/B01/ /B04/ /B08/	DR	Not applicable as per the registered PDD.	-	-
5. Calculations					
5.1 Have all the calculations related to the baseline emissions been carried according to the formulae and methods described in the registered PDD and applied methodology?	/P01/ /P03/ /P06/ /P07/ /P08/ /B01/ /B04/ /I-01/	DR, I	The calculations and applied formulae and method for calculation of baseline emission are in accordance with the registered monitoring plan and are in line with the requirements of the applied methodology AMS ID/ Version 07. The formulae and the methods referred in the MR and the spread sheet for estimation of GHG reduction comply with the corresponding formulae and methods in the registered PDD. However, the formulae used for ER calculation has not been provided in section E.1 of the MR. In this context CAR-04 is raised and closed.	~~CAR-04~~	-
5.2 Have all the calculations related to the project emissions been carried according to the formulae and methods described in the registered PDD and applied methodology?	/B01/ /B04/ /B05/ /B08/ /I-01/	DR, I	This is a fifth periodic verification. Project emissions are not applicable because for this project which is confirmed by justification provided in PDD and it is also reconfirmed during the site visit.	OK	-

5.3	Have all the calculations related to the leakage emissions been carried according to the formulae and methods described in the registered PDD and applied methodology?	/B01/ /B04/ /B05/	DR	Yes	OK	-

Table 2: List of Requests for Corrective Action (CAR) and Clarification (CL)						
No.	**Type of request**	**Observation**	**Reference (Table 1)**	**Summary of project owner response**	**Revised section(s)/Annexe(s) of the MR**	**Verification team conclusion**
1. .	CAR-01	Title of the project activity as mentioned in the MR does not match with the project page title.	1.1	Title of the project activity has been revised in the MR in line with the registered PDD.	MR	Revision in the MR is found to be OK. CAR is closed.
2.	CAR-02	In section B.1 of the MR, PP needs to mention the downtime of the equipment (Cp CDM-MR EB 54 Annex 34 section B.1 point 2).	1.2	Down time of the three sites has been provided in the revised MR.	B.1	Down time of the three sites has been provided in the revised MR and evidence for the same provided to the verification team. Hence the CAR is closed.
3.	CAR-03	Calibration dates of the generation meter for unit 2 of the Killa site and auxiliary meter for Sahoke site (which have been changed on 28/12/2011) has not been provided explicitly in the MR. Moreover, make and accuracy class of the old meters needs to be mentioned in the MR.	3.2.2	Calibration dates of the all the generation meter and auxiliary meters have been provided and make and accuracy class of the old auxiliary meter and generation meters have been provided in the revised MR.	D.2	Correction in the MR is found to be appropriate, Hence the CAR is closed.
4.	CAR-04	In section E.1 of the MR, formulae used for calculation is missing (CP CDM-MR EB 54 Annex 34 section E.1 the section shall include all the formulae used for calculation). Moreover, the extrapolated value (= 30,719) of estimated ER is wrongly provided in section E.5 of MR.	5.1	Baseline emission formula has been incorporated in the MR in line with the applied meth and the registered PDD.	E.1	As the required formula has been provided in the revised MR section E.1, the CAR is closed.

Table 3: List of forward action requests (FARs)				
FAR number	**Observation**	**Reference (Table 1)**	**Summary of project participants' response**	**Verification team conclusion**
-	-	-	-	-

Appendix B

Certification statement

to the Verification report 01 997 9105060718

Certification statement

TUV Rheinland China Ltd., the DOE, has performed a periodic verification of the registered CDM project activity No 0329, "Babanpur, Killa and Sahoke Mini Hydroelectric Projects" in India. The project activity is designed to generate emission reductions by electricity generation from hydro power plant. This verification was performed to identify the compliance of the project activity with implementation and monitoring requirements, and to verify the actual amount of achieved emission reductions.

The verification is based on:

— PDD (no version as per the UNFCCC project page), registered with the CDM Executive Board on 30/04/2006;

— Approved monitoring methodology AMS I.D "Renewable electricity generation for a grid", version 7;

— Monitoring report version 03 dated 14/10/2011.

This statement covers verification period of 16 months between 01/04/2010 and 31/07/2011.

The DOE has raised four (4) corrective action requests all of which have been successfully resolved by the PP.

The DOE, herewith certifies that the project activity, achieved emission reductions by sources of GHG equal to 26,883 tCO_2e and all monitoring requirements have been fulfilled.

2011-11-29 Date	2011-11-29 Date	2011-11-28 Date
Mr Praveen N Urs CDM Program Manager TUV Rheinland China Ltd.	Dr. Lixin Li Technical Reviewer TUV Rheinland China Ltd.	Mr.Sanjay Kumar Agarwalla Team Leader TUV Rheinland India Pvt.Ltd.

Appendix C

Certificates of Competence

Qualification

Agarwalla, Sanjay Kumar /

Emission Trading
United Nations Framework Convention on Climate Change

Auditor No.:
(AuditorenRegNr)

Appointed: (Zugelassen)	☒ ja	Qualification Level: (Qualifikationsstufe)	Lead Auditor
External: (Externer)	☐ ja	Add. reviewer: (Zusätzlicher Prüfer)	☐ yes

EAC Scopes: (EAC Branchen)
CDM 01 - Energy industries (renewable - / non-renewable sources)
CDM 05 - Chemical industry
CDM 11 - Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride
CDM 12 - Solvents use
CDM 03 - Energy demand

Add. qualification: (zus. Qualifikation)

First Appointment: (Erstberufung)	02/08/2011	Valid to: (Gültig bis)	02/07/2014

Remarks: Valid for TA 1.1, 1.2, 3.1, 5.1/11.1/12.1

Languages: Hindi
English

Experience Exchange

Date	Location	Remarks	Accreditation(s)

Monitoring

Latest Monitoring: (letzte Beurteilung)

Next Monitoring: (nächste Beurteilung)

Remarks:

View / Edit Monitoring

History of scope allocation

Date:	2011-02-09
Change:	EAC CDM, CDM, CDM, CDM added
By:	Manfred Brinkmann
Reason:	Valid for TA 1.2, 5.1/11.1/12.1

History

Created:	02/08/2011 08:59:20 AM	Sanjay Kumar Agarwalla/Ind/TUV
Modified:	10/28/2011 09:04:00 PM ZE9	Manfred Brinkmann/Jpn/TUV
	10/28/2011 09:03:49 PM ZE9	Manfred Brinkmann/Jpn/TUV
	10/28/2011 09:03:16 PM ZE9	Manfred Brinkmann/Jpn/TUV
	10/28/2011 09:03:08 PM ZE9	Manfred Brinkmann/Jpn/TUV
	10/28/2011 08:49:23 PM ZE9	Manfred Brinkmann/Jpn/TUV
	10/28/2011 08:49:08 PM ZE9	Manfred Brinkmann/Jpn/TUV
	02/09/2011 02:00:27 PM ZE9	Manfred Brinkmann/Jpn/TUV
	02/08/2011 08:59:38 AM	Sanjay Kumar Agarwalla/Ind/TUV

Qualification

Mane, Dinesh /

Emission Trading
United Nations Framework Convention on Climate Change

Auditor No.:
(AuditorenRegNr)

Appointed: (Zugelassen)	☒ ja	Qualification Level: (Qualifikationsstufe)	Auditor
External: (Externer)	☐ ja	Add. reviewer: (Zusätzlicher Prüfer)	☐ yes
EAC Scopes: (EAC Branchen)	CDM 13 – Waste handling and disposal		
Add. qualification: (zus. Qualifikation)			
First Appointment: (Erstberufung)	2011/02/07	Valid to: (Gültig bis)	2014/02/06

Remarks: Valid for TA 13.1

Languages: Hindi
English
Indian

Experience Exchange

Date	Location	Remarks	Accreditation(s)

Monitoring

Latest Monitoring:
(letzte Beurteilung)

Next Monitoring:
(nächste Beurteilung)

Remarks:

View / Edit Monitoring

History of scope allocation

Date (Datum)	Change (Änderung)	By (durch)	Reason (Begründung)
2011-02-07	EAC CDM added	Manfred Brinkmann	Valid for TA 13.1

History

Created:	2011/02/04 15:40:22 ZE5B	Dinesh M Mane/Ind/TUV
Modified:	2011/02/07 17:52:46	Manfred Brinkmann/Jpn/TUV

2011/02/07 17:52:41	Manfred Brinkmann/Jpn/TUV
2011/02/07 17:52:40	Manfred Brinkmann/Jpn/TUV
2011/02/07 17:52:16	Manfred Brinkmann/Jpn/TUV
2011/02/07 17:51:55	Manfred Brinkmann/Jpn/TUV
2011/02/04 15:40:35 ZE5B	Dinesh M Mane/Ind/TUV

Qualification

Sharma, Shivraj /

Emission Trading
United Nations Framework Convention on Climate Change

Auditor No.:
(AuditorenRegNr)

Appointed: (Zugelassen)	☒	Qualification Level: (Qualifikationsstufe)	Auditor
External: (Externer)	☐	Add. reviewer: (Zusätzlicher Prüfer)	☐ yes
EAC Scopes: (EAC Branchen)			
Add. qualification: (zus. Qualifikation)			
First Appointment: (Erstberufung)	2011/02/07	Valid to: (Gültig bis)	2014/02/06

Remarks:	Valid for TA 1.2, 3.1, 13.1
Languages:	Hindi English

Experience Exchange

Date	Location	Remarks	Accreditation(s)

Monitoring

Latest Monitoring:
(letzte Beurteilung)

Next Monitoring:
(nächste Beurteilung)

Remarks:

View / Edit Monitoring

History of scope allocation

Date (Datum)	Change (Änderung)	By (durch)	Reason (Begründung)

History

Created:	2011/02/04 15:17:06 ZE5B	Shivraj Sharma/Ind/TUV
Modified:	2011/02/07 16:21:14	Manfred Brinkmann/Jpn/TUV
	2011/02/04 15:20:02 ZE5B	Shivraj Sharma/Ind/TUV

Qualification

Li, Lixin /

Emission Trading
United Nations Framework Convention on Climate Change

Auditor No.:
(AuditorenRegNr)

Appointed: (Zugelassen)	☒ ja	Qualification Level: (Qualifikationsstufe)	
External: (Externer)	☐ ja	Add. reviewer: (Zusätzlicher Prüfer)	☒ yes
EAC Scopes: (EAC Branchen)	CDM 01 – Energy industries (renewable – / non-renewable sources) CDM 03 – Energy demand		
Add. qualification: (zus. Qualifikation)			
First Appointment: (Erstberufung)	2010/09/07	Valid to: (Gültig bis)	2013/09/06

Remarks: Appointed as Technical Reviewer for
TA 1.1, 1.2
TA 3.1

Languages:

Experience Exchange

Date	Location	Remarks	Accreditation(s)

Monitoring

Latest Monitoring:
(letzte Beurteilung)

Next Monitoring:
(nächste Beurteilung)

Remarks:

View / Edit Monitoring

History of scope allocation

Date:
Change:
By:
Reason:

Date:
Change:
By:
Reason: