



VOLUNTARY CARBON STANDARD 2007.1

VERIFICATION REPORT

86 MW HYDRO PROJECT IN HIMACHAL PRADESH

**Monitoring Period: 2009-10-01 to 2010-03-31
(incl. both days)**

Report No: 8106696712 - 10/165-V05

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Name of Verification company:	Date of the issue:
TÜV NORD CERT GmbH	2010-04-27
Report Title:	Approved by:
86 MW Hydro Project in Himachal Pradesh V05	Mr. Rainer Winter
Client:	Project Title:
Malana Power Company Limited	86 MW Hydro Project in Himachal Pradesh
Summary:	
Malana Power Company Limited has commissioned the TÜV NORD JI/CDM Certification Program to carry out the fifth periodic verification of the project "86 MW Hydro Project in Himachal Pradesh", with regard to the relevant requirements of VCS 2007.1 standard. The project activity involves generation of electricity by using the renewable energy source (hydro) for a grid system in the state of Himachal Pradesh, India. Thus, the project activity displaces electricity and green house gas (GHG) emissions currently produced by fossil fuel-burning Power plants. The generated electricity by the project activity is being exported to the Northern regional grid (now a part of NEWNE grid) in India. Reporting period: From 01/10/2009 to 31/03/2010. In the course of the verification five (05) Corrective Action Requests (CARs) were raised. One (01) Forward Action Request (FAR) from the previous verification was opened. All these CAR and FAR were successfully closed. The verification is based on the draft monitoring report^{/MR1/}, revised monitoring report^{/MR2/}, emission reduction calculation spreadsheet^{/XLS1//XLS2/}, the monitoring plan as set out in the validated PDD^{/PD/}, the validation report^{/VAL/}, the third and fourth verification reports^{/VER3//VER4/}, the revision in the monitoring plan^{/RMP/}, and supporting documents^{/LOG//CAL//TRG//JMR/} made available to the TÜV NORD JI/CDM CP by the project participant. As the result of the 5th periodic verification, the verifier confirms that the GHG emission reductions are calculated without material misstatements in a conservative and appropriate manner. TÜV NORD JI/CDM CP herewith confirms that the project has achieved emission reductions in the above mentioned reporting period (01/10/2009 to 31/03/2010) as follows: Emission reductions 45,737 t CO₂ equivalents The monitoring period has been split into two parts and the verified emission reductions from 01-10-2009 to 10-03-2010 (approximately 05:42 PM) is 40,000 tCO₂e and from 10-03-2010 (approximately 05:43 PM) to 31-03-2010 is 5,737 tCO₂e totalling to 45,737 t CO₂ equivalents for the monitoring period.	

Work carried out by:	Number of pages:
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Abbreviations

CA	Corrective Action / Clarification Action
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CL	Clarification Request
CO₂	Carbon dioxide
CO_{2e}	Carbon dioxide equivalent
CP	Certification Program
cumecs	cubic metre per second
ER	Emission Reduction
FAR	Forward Action Request
GHG	Greenhouse gas(es)
HEP	Hydro Electric Project
HPSEB	Himachal Pradesh State Electricity Board
IPCC	Intergovernmental Panel on Climate Change
JMR	Joint Meter Reading
Km	Kilo meter
KV	Kilo Volt
kWh	Kilo Watt Hour
m	Meter
MP	Monitoring Plan
MR	Monitoring Report
MWh	Mega Watt Hour
NEWNE	North East West North East (Grid of India)
QC/QA	Quality control/Quality assurance
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Voluntary Carbon Standard
PDD	VCS V01 Project Design Document
VCU	Voluntary Carbon Unit
VVM	Validation and Verification Manual

Table of Contents	Page
1 INTRODUCTION	6
1.1 Objective.....	6
1.2 Scope and Criteria	6
1.3 VCS Project Description.....	7
1.3.1 Project Characteristics	7
1.3.2 Project Location	7
1.3.3 Technical Project Description.....	7
1.3.4 Appointment of team members and technical reviewer.....	8
1.4 Level of Assurance	9
2 METHODOLOGY	10
2.1 Review of Project Documentation	11
2.2 On-Site Assessment	11
2.2.1 Review of Performance Records.....	11
2.2.2 Follow-up Interviews	11
2.2.3 Collection of Measurements.....	12
2.2.4 Observation of established practices and testing of the accuracy of monitoring equipment.....	12
2.3 Determination of the reductions in GHG emissions	13
2.4 Review of additional data from other sources if appropriate	13
2.5 Review of monitoring results and verification of the correct application of monitoring methodologies	13
2.6 Resolution of any material discrepancy	13
3 VERIFICATION FINDINGS	15
3.1 Remaining issues, including any material discrepancy, from previous validation	15
3.2 Project implementation	18
3.3 Completeness of monitoring	19
3.4 Accuracy of emission reduction calculations.....	22
3.5 Quality of evidence to determine emission reductions.....	24
3.6 Management and operational system	26
4 VERIFICATION STATEMENT.....	28
5 REFERENCES	30

1 INTRODUCTION

The Malana Power Company Limited has commissioned the TÜV NORD JI/CDM Certification Program to carry out the verification of the project:

“86 MW Hydro Project in Himachal Pradesh”

with regard to the relevant requirements of the Voluntary Carbon Standard 2007.1^{/VCS/}. The verifiers have reviewed the implementation of the monitoring plan (MP) in the registered VCS project for the monitoring period 2009-10-01 to 2010-03-31.

The applied monitoring methodology is ACM0002/Version 06 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”^{/ACM0002/}.

1.1 Objective

The purpose of this verification, by independent checking of objective evidence, is as follows:

- to verify that the project is implemented as described in the project design document;
- to assess the implementation of the monitoring plan (MP) content in the VCS V01 PDD;
- to assess the project's compliance with other relevant rules, including the host country (India) legislation;
- to confirm that the monitoring system is implemented and fully functional to generate voluntary emission reductions (VERs / VCUs) without any double counting; and
- to establish that the data reported are accurate, complete, consistent, transparent and free of material error or omission by checking the monitoring records and the emissions reduction calculation.

1.2 Scope and Criteria

The verification of this project is based on the validated project design document^{/PD/}, the monitoring report^{/MR1//MR2/}, emission reduction calculation spread sheet^{/XLS1//XLS2/}, supporting documents^{/LOG//CAL//JMR/} made available to the verifier and information collected through performing interviews^{/IM01//IM02//IM03/} and during the on-site assessment. Furthermore publicly available information was considered as far as available and required.

The TÜV NORD JI/CDM CP has employed a risk-based approach in the verification, focusing on the identification of significant risks and reliability of project monitoring and generation of emission reductions.

1.3 VCS Project Description

1.3.1 Project Characteristics

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

Table 1-1: Project Characteristics

Item	Data			
Project title	86 MW hydro project in Himachal Pradesh			
Project owner	Malana Power Company Limited			
Any specific project categories	☐	Mega project (> 10 ⁶ t CO _{2eq} / a)		
	☐	Micro project (< 5000 t CO _{2eq} / a)		
	☐	AFOLU project		
	☐	Grouped project		
	☒	No specific project category		
VCS MR dated	Draft:	2010-04-02	Final:	2010-04-12
Applied Methodology	ACM0002/Version 06			
Project starting date	2001-07-05			
Crediting period	☐	Renewable Crediting Period (7 y)		
	☒	Fixed Crediting Period (10 y)		
Start of crediting period	2001-07-05			

1.3.2 Project Location

The details of the project location are given in table 1-2:

Table 1-2: Project Location

No.	Project Location
Host Country	India
Region:	Himachal Pradesh
Project location address:	Jari village, Kullu district
Latitude:	32° 0.2'N
Longitude:	77° 14.5'E

1.3.3 Technical Project Description

The project is a grid connected hydro power plant which is run of the river type with a small reservoir. It involved construction of a barrage across Malana river, 3 Km downstream of Malana village, a head regulator, a de-silting basin storage reservoir to divert water draft of 21 cumecs through a 3.2 Km long headrace tunnel, ending in a 5 m diameter surge shaft.

The water discharged is channelled through a 2.85 m wide D- shaped pressure tunnel or head race tunnel. At the end of headrace tunnel, a surge shaft has been provided which is 72 m high and has an orifice diameter of 1.4 m to certain the height of surges.

A vertical pressure shaft of 2.5 m diameter followed by a steel lined horizontal pressure tunnel of 2.2 m diameter which runs down the hill slope and bifurcates into two branches of 1.5 m diameter each to feed the two vertical axis type Pelton units. To exploit the net head of 480 meters, a power house has been created with two units of 43 MW each and is also housing the step-up transformer. The generated electricity is fed into NEWNE grid through 132 KV transmission lines.

The key parameters of the project are given in table 1-3:

Table 1-3a: Technical data of the project

Parameter	Unit	Value
Capacity of Reservoir	cubic meter	2,35,000
Diameter of Penstock	meter	2.2
Design Discharge	cubic meter/ second	21
Head race tunnel	meter	One head race tunnel with 3280m length
Installed Capacity	MW	86
Size of Power House	-	55m X 18.7m X 28.9 m
Type of Turbines	-	Pelton , Vertical Axis
Generating Units	MW	2 Units of 43 MW each
Maximum Gross Head	meter	505

Table 1-3b: Parameters confirmed during verification

Parameter	Name	Unit	Value
Malana HEP net Electricity Generated	EG _y	kWh	60,988,011
Toss HEP electricity injected into Malana yard	EG _{y Toss}	kWh	23,533.433

1.3.4 Appointment of team members and technical reviewer

On the basis of a competence analysis and individual availabilities a verification team was appointed. Furthermore also the personnel for the technical review and the final approval was determined.

The list of involved personnel, the tasks assigned and the qualification status are summarized in the table 1-4 below.

Table 1-4: Involved Personnel

	Name	Company	Function ¹⁾	Qualification Status ²⁾	Sectoral competence	Technical competence	Host country Competence	Controlling competence
☒ Mr. ☐ Ms.	Archak Pattanaik	TUV India Pvt. Ltd.	TL	A	☐	☐	☒	☒
☒ Mr. ☐ Ms.	Ma Paa Puratchikkanal	TUV India Pvt. Ltd.	TM	TE	☒	☒	☒	☒
☒ Mr. ☐ Ms.	Ashwin A S	TUV India Pvt. Ltd.	TM	E	☐	☐	☒	☐
☒ Mr. ☐ Ms.	Vishnu Patidar	TUV India Pvt. Ltd.		T	☐	☐	☒	☐
☒ Mr. ☐ Ms.	Stefan Winter	TUV Nord Germany	TR	E	☒	☒	☐	☐
☒ Mr. ☐ Ms.	Rainer Winter	TUV Nord Germany	FA	SA	☒	☒	☐	☒

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

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

1.4 Level of Assurance

The verification has been planned and organized to achieve a

☒ reasonable level of assurance

☐ limited level of assurance.

2 METHODOLOGY

The verification of the project consisted of the following steps:

- Contract review
- Appointment of team members and technical reviewers
- Publication of the monitoring report
- Desk review of the Monitoring Report^{MR1/} submitted by the client and additional supporting documents.
- Verification planning,
- On-Site assessment,
- Background investigation and follow-up interviews with personnel of the project developer and its contractors,
- Draft verification reporting
- Resolution of corrective actions (if any)
- Final verification reporting
- Technical review
- Final approval of the verification.

The sequence of the verification is given in the table 2.1 below:

Table 2.1: Verification sequence

Topic	Time
Assignment of verification	2010-03-23
On-site visit	2010-04-07
Draft reporting finalised	2010-04-07
Technical review on draft reporting finalised	2010-04-08
Final reporting finalised	2010-04-27
Technical review on final reporting finalised	2010-05-14
Final corrections	-

The main verification steps are described below.

2.1 Review of Project Documentation

The validated VCS V01 PDD^{/PD/}, VCS MR^{/MR1//MR2/} and supporting background documents^{/LOG//JMR//CAL//TRG/} related to the project implementation, project design and baseline were reviewed

Furthermore, the verification team used additional documentation by third parties like host party legislation, technical reports referring to the project design or to the basic conditions and technical data.

The references used in the course of this verification are summarized in section 5.

2.2 On-Site Assessment

2.2.1 Review of Performance Records

The project proponent furnished performance records of the project in form of data logs, registers^{/LOG/}, generation reports^{/JMR/}, training records^{/TRG/} and calibration certificates^{/CAL/} etc. VER Calculation sheet^{/XLS1//XLS2/} was checked thoroughly by the verification team for correctness of calculation approach. Data input values were also checked from the records maintained by the project proponents. Result of calculations reported in the monitoring report^{/MR2/} was checked against data values as available from the project proponent in VER calculation sheet^{/XLS2/}. These data values and other information related to project performance including calibration and meter testing details are available in the form of data logs and records duly archived and maintained as per the quality assurance/quality control procedure specified as a part of monitoring plan given in the validated VCS V01 PDD^{/PD/}.

Follow-up Interviews

The verification team has carried out interviews in order to assess the information included in the project documentation and to gain additional information regarding the compliance of the project with the relevant criteria applicable for the VCS.

During verification the verification team has performed interviews to confirm selected information and to resolve issues identified in the document review. The main topics of the interviews are summarized in Table 2-2.

Table 2-2: Interviewed persons and interview topics

Interviewed Persons / Entities	Interview topics
Project proponent representatives: Represented by Mr. M. A. Rafiq	- General aspects of the project - Technical equipment and operation - Changes since validation

Interviewed Persons / Entities	Interview topics
(Assistant Manager-Electrical) Project consultant Mr. Satyapal Singh (EVI)	- Monitoring and measurement equipment - Remaining issues from previous verifications - Calibration procedures - Quality management system - Involved personnel and responsibilities - Training and practice of the operational personnel - Implementation of the monitoring plan - Monitoring data management - Data uncertainty and residual risks - GHG calculation - Procedural aspects of the verification - Operation and Maintenance - Environmental aspects - Editorial issues of the Monitoring Report

A comprehensive list of all interviewed persons is part of section 5 'References', Table 5-4.

2.2.2 Collection of Measurements

Measurements of the data parameters used for calculation of emission reductions in the project are undertaken by the project proponents as per the approved monitoring plan given in the validated VCS V01 PDD^{/PD/} and the revision in the monitoring plan^{/RMP/}.

The verification team checked data measurement procedures including metering arrangements, collection, reporting/recording and archiving of data at the time of site visit and found the practices were in compliance with approved monitoring plan as contained in validated PDD^{/PD/} and the revision in the monitoring plan^{/RMP/}.

2.2.3 Observation of established practices and testing of the accuracy of monitoring equipment

Accuracy of monitoring equipment in the project is maintained by means of periodic testing/calibration^{/CAL/} and other measures by the project proponent as specified in the QA/QC procedures given in approved monitoring plan of validated VCS V01 PDD^{/PD/}. The established practices and testing of accuracy of the monitoring equipment was checked at the site by means of calibration certificates and other documentary evidences furnished by the project proponent^{/TRG/} on site and were found appropriate.

2.3 Determination of the reductions in GHG emissions

Emission reductions have been transparently calculated as per the approach approved in the Validated VCS V01 PDD^{/PD/} and the revised monitoring plan^{/RMP/}. The PP has used monitored data and ex ante fixed data as per the applied methodology^{/ACM0002/}. The values used for calculation of GHG emission reductions have been thoroughly checked against the electrical energy sent out the project activity to HPSEB-Bajaura sub-station^{/JMR/} and the electricity injected from toss HEP at the Malana yard. The data has been found to be appropriate and correct. The spreadsheet has been submitted by the PP which clearly and transparently mentions value of each data parameter used for calculation. The calculations are traceable and follow logical steps. The input values have been verified from the reliable and authentic sources including monitoring records^{/JMR//LOG/}, validated PD^{/PD/} and applied methodology^{/ACM0002/}.

2.4 Review of additional data from other sources if appropriate

No additional data from other sources has been involved in the GHG emission reduction calculation.

2.5 Review of monitoring results and verification of the correct application of monitoring methodologies

The verification team checked monitoring report^{/MR1//MR2/} and VER calculation sheet^{/XLS1//XLS2/} for any material misstatements from the project description as provided in the validated VCS V01 PDD^{/PD/} and monitoring records^{/JMR//LOG/}. Monitoring results were found in line with the requirements of applied monitoring methodology as stipulated in the validated VCS V01 PDD^{/PD/} and the revised monitoring plan^{/RMP/}. It is concluded that monitoring methodology ACM0002, version 06 is correctly applied.

2.6 Resolution of any material discrepancy

Material discrepancies identified in the course of the verification are addressed either as CARs, CLs or FARs.

A **Corrective Action Request (CAR)** is established where:

- mistakes have been made in assumptions, application of the methodology or the project documentation which will have a direct influence the project results,
- the requirements deemed relevant for verification of the project with certain characteristics have not been met or

- there is a risk that the project would not be registered or that emission reductions would not be able to be verified and certified.

A **Clarification Request (CL)** will be issued where information is insufficient, unclear or not transparent enough to establish whether a requirement is met.

A **Forward Action Request (FAR)** will be issued when certain issues related to project implementation should be reviewed during the first verification.

A detailed list of the CARs CLs and FAR raised and discussed in the course of this verification is included in the next section 3 of this report.

3 VERIFICATION FINDINGS

In this section the assessments and findings from the desk review of the VCS V01 PDD, site visit, interviews and supporting documents as well as the final assessments are summarised. Table 3-1 includes an overview of all raised CARs, CLs and FARs.

Table 3-1: Overview of CARs, CLs and FARs issued

No.	Topic / Chapter	CAR	CL	FAR
3.1	Remaining issues, including any material discrepancy	-	-	1
3.2	Project implementation	-	-	-
3.3	Completeness of monitoring	03	-	--
3.4	Accuracy of emission reduction calculations	01	-	-
3.5	Quality of evidence to determine emission reductions	01	-	-
3.6	Management and operational system	-	-	-
-	SUM	05	0	01

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

Description

- During the previous verification (fourth periodic verification) it was observed that the electricity from the Toss hydro project is injected into the Bajaura transmission line from Malana with effect from 11/08/2009. It has been evidenced from the document review and the interviews that the energy meter at the Bajaura substation, which was earlier exclusively for net electricity, exported to the grid from Malana is now measuring the net electricity exported from Toss as well. Thus the net electricity supplied to the grid from Malana HEP is now calculated and not directly measured. This deviates from the monitoring plan as in annex IV of the validated VCS V01 PDD. In this context, FAR I2 was raised in the fourth verification report^{VER4/} for the monitoring period (01/04/2009 to 30/9/2009), PP needs to ensure the continuous monitoring of the data ($E_{GY,TOSS}$) with regard to the Toss HEP and Periodic calibration of the tri-vector meters at injection point of Toss HEP with Malana HEP line.
- The verification team during the site visit has observed that the readings from the Toss HEP is taken on an hourly basis. The data is archived appropriately

electronically as well as in paper. The Malana HEP monitoring team is also found to cross check the logged data with the JMR readings from the Toss HEP project. The calibrations certificates of the installed meters at the Toss injection point in the Malana yard was also checked and found to be satisfactory and in conformity to the revised monitoring plan and the FAR I2 response in the previous verification report^{/VER4/}.

- The FAR was opened and successfully closed during the fifth verification.

Related Findings

☐ No CARs, CLs or FARs have been identified in this context

The following finding(s) have been addressed:



Finding: Issues from previous verification		3.1-1		
Classification		☐ CAR	☐ CL	☒ FAR
Description of finding (raised during previous verification)		In the context of CAR I1, the continuous monitoring of the data with regard to the Toss HEP has to be ensured for the next verifications. Periodic calibration of the trivector meters at injection point of Toss hydro project has to be ensured for the next verifications.		
Corrective Action #1 (response during previous verification)		The trivector meters at injection point of Toss hydro project would be calibrated annually and records of the same would be kept for future. Moreover the installed meters at Toss were calibrated at the time of installation and the calibration is valid for the monitoring period (01/04/2009 to 30/9/2009).Already the meter reading is being recorded and monitored on a continuous basis at Malana Yard (Sent out point) since beginning of operation. An hourly log is prepared by the shift in-charge at both Toss and Malana. Daily hourly data is aggregated in a daily report.		
DOE Assessment #1		The proposed corrective action is deemed appropriate.		
DOE Assessment #2 (during current verification)		The verification team during the site visit has observed that the readings from the Toss HEP is taken on an hourly basis. The data is archived appropriately electronically as well as in paper. The Malana HEP monitoring team is also found to cross check the logged data with the JMR readings from the Toss HEP project. The calibrations certificates of the installed		

	meters at the Toss injection point in the Malana yard was also checked and found to be satisfactory. However it is observed that the monitoring details of the Toss meters have not been provided in the MR version 1. PI refer CAR 3.3.1 and CAR 3.3.2.
Corrective Action #2 (during current verification)	Monitoring details of the Toss meters have been incorporated in the annex-1 of the revised MR.
DOE Assessment #3 (during current verification)	Elaboration of the monitoring details of electricity injected at Malana yard from Toss HEP is required in Annex I of the MR.
Corrective Action #3	Monitoring detail of electricity generation from Toss HEP have been elaborated in the annex I of the revised MR.
DOE Assessment #4	The details of the monitoring of the electricity injected from Toss HEP into Malana yard is found to be explained in Annex I of the monitoring report version 2. The calibration certificates submitted have been checked. It has been established that the only calibrated meters have been in use during the monitoring period at Toss injection point. It has also been observed during the site visit that HPSEB (which is a government body and a third party who is also the buyer of electricity generated) appointed personnel is monitoring and recording the Toss injection at an hourly basis. The recording is also found to be taken by the Malana shift in-charge at an hourly basis from the Toss injection point to cross check the data. The verification team is satisfied by the monitoring and quality of the data at Toss injection point at Malana yard. This FAR is closed.
Conclusion	☐ To be checked during the next periodic verification ☒ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements

Final Assessment

Corrective actions against the remaining issues from the verification period (01/04/2009 to 30/9/2009)^{VER4/} have been found to be addressed by the PP and verification team have assessed the corrective actions by means of the site visit interviews^{/IMO1//IMO2/} and testing reports of the Toss energy meter^{/CAL/} and found appropriate and correct. Thus remaining issues from the last verification are now

closed.

3.2 Project implementation

Description

- The project has been implemented as described in the Project Design Document^{/PDD/} validated as per VCS v1 and is grandfathered to VCS 2007.1^{/VCS//RMP/}. There is no change in the key equipments as described in Table 1-3a.
- During the monitoring period covering 01/10/2009 to 31/03/2010 the project displaced 60,988 MWh of NEWNE grid in India. This was verified by the verification team during the on site visit by checking the recorded generation data^{/LOG/}, plant records, joint metering report^{/JMR/} and invoices against the power supplied to the grid^{/INV/}.
- For the monitoring purpose, there are four meters (main and check) at the generation point for measuring electricity generated by the two generators, and another four meters (main and check) for measuring electricity transferred from the plant to the substation at the outgoing point through the two lines. Further there are four meters (main and check) at the substation for measuring the electricity supplied to the grid.
- There are two meters (Main and check meters) at the injection point of TOSS electricity into the Malana yard.
- The meter readings at all the three points in Malana HEP and at the Toss HEP injection point are found to be recorded at an hourly basis in the log sheets by the shift in-charge at Malana HEP.
- Daily, weekly and monthly generation reports are also found to be archived.
- Monthly and weekly invoices^{/INV/} with the grid company were available for verification.
- All required equipment and procedures are available and implemented as mentioned in the PDD^{/PD/} and the revised monitoring plan^{/RMP/}.
- The submitted monitoring report^{/MR1//MR2/} which forms the basis of the verification was prepared by summarizing consolidated monthly data over the whole monitoring period in accordance with the monitoring plan.
- All necessary monitoring instruments are installed. The measuring devices are well known and calibrated by authorised agency.
- As per the onsite assessment, observations, interviews^{/IM01//IM02//IM03/} and collected evidences, it was concluded that the project has been implemented as per the project description provided in the validated PDD^{/PD/} and the revised monitoring plan^{/RMP/}.

Related Findings

- ☒ No CARs, CLs or FARs have been identified in this context
- ☐ The following finding(s) have been addressed:

Final Assessment

The project is found to be implemented as described in validated VCS V01 PDD^{/PD/} and the revised monitoring plan^{/RMP/}.

3.3 Completeness of monitoring

Description

- The monitoring and reporting procedures reflect the requirements of the monitoring plan of the validated V01 PDD^{/PD/} and the revised monitoring plan^{/RMP/}. The monitoring parameters are recorded as per the monitoring plan and methodology^{/ACM0002/}.
- Following metering and measurement was verified during onsite visit dated 2010/04/07:
 1. Malana HEP Generation (EG_Y)
 2. Energy injected from Toss HEP into Malana yard (EG_{Y, TOSS})
 3. Energy Injected at Bajoura sub station from Malana yard
- The calibration records were made available to the verification team^{/CAL/}. As from the previous verification, one energy meter (AB0004A) has been found to be replaced (with AB0012A) on 20/10/2009 at Malana Transmission point (Yard/Sent Out). The calibration certificate of the replace energy meter (AB0012A) is also submitted to the verification team and No abnormality was found in the metering.
- The reporting procedures reflect the requirements of the monitoring report^{/MR1//MR2/}. The net electricity replaced is recorded hourly, summarized daily, weekly and month.
- Archiving is found to be appropriate during the whole monitoring period. These data form the basis of emission reduction calculation^{/LOG/}.
- The daily, weekly and monthly data also was found to be cross checked by the Assistant manager (Electricals) to weed out any anomaly.
- It has been found to the verification team's satisfaction that the data from Toss HEP

is also being monitored from the date of installation, as mentioned above^{/LOG/}.

- The personnel involved have been found to be given training which also involved skill development in data management and certain software for monitoring and archiving from other hydro projects in South East Asia. During the interviews it was known that further training was planned^{/TRG/}.
- The verification team has verified the monthly generation reports^{/JMR/}, log books^{/LOG/}, invoices^{/INV/} and found they are recorded and maintained in line with monitoring plan of the validated VCS V01 PDD and methodology ACM0002 version 06. Thus the DOE confirms the completeness of the monitoring in the key areas.
- However the following CARs were raised on the transparent description of monitoring in the monitoring report and were closed successfully.

Related Findings

☐ No CARs, CLs or FARs have been identified in this context

☒ The following finding(s) have been addressed:

Finding: Completeness of Monitoring	3.3.1
Classification	☒ CAR ☐ CL ☐ FAR
Description of finding	A consolidated CAR is raised on the editorial issues of the MR: 1. Revised monitoring plan which was accepted by the DOE during the 4th verification needs to be referenced in section 2 of the monitoring report. 2. The history of issuance in section 2 mentions 5th verification too. Since the 5th verification is the current verification and has not yet been issued, it cannot be a part of the table. Needs correction. 3. Section 4 mentions Annex 1 contains information on QA/QC. However, the Annex 1 of MR version 1 has monitoring details. Correction required.
Corrective Action #1	1. Reference of the revised monitoring plan has been incorporated in section 2 of the MR. 2. The reference to the fifth verification has now been excluded from the history of issuances in section 2. 3. QA/QC with monitoring detail has been incorporated in the Annex-1.

DOE Assessment #1	1. During the 4th verification the DOE had accepted the revision in the monitoring plan dated 07/12/2009^{/RMP/}. This has been found to be correctly referenced now in section 2 of the MR version 2^{/MR2/}. The CAR is closed. 2. The reference to the fifth issuance has been found to be removed from the history of issuances. This removal is deemed correct as the fifth issuance has not been done or confirmed as of date and so should not be a part of the issuance history. The CAR is closed. 3. The QA/QC details have been found to be incorporated in Annex-I. The reference in section 4 of MR version 2^{/MR2/} also has been found to be corrected. The CAR is closed.
Conclusion	☐ To be checked during the next periodic verification ☒ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements

Finding: Completeness of Monitoring	3.3.2		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding	Details of the meters from the Toss HEP at Malana yard and the details of its calibration are absent in section 7 of the MR. Monitoring report needs to be corrected accordingly.		
Corrective Action #1	Details of the meters from the Toss HEP at Malana yard and the details of its calibration have been incorporated in the section of 7 of the MR.		
DOE Assessment #1	Section 7 of the MR version 2 ^{/MR2/} has been found to be updated with details of Toss meters. The meters numbers are correct as verified during the site visit ^{/PHOTO/} and test certificates ^{/CAL/} . The CAR is closed.		
Conclusion	☐ To be checked during the next periodic verification ☒ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements		

Finding: Completeness of Monitoring	3.3.3		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding	As per the revised monitoring plan ^{/RMP/} , the energy sent out by Toss, EG _{y, Toss} (recorded by HPSEB) needs to be considered as a monitoring parameter and details of the same needs to be mentioned in the monitoring report. However, this is not included as a monitoring parameter in the MR.		
Corrective Action #1	As per the revised MP, monitoring parameter EG _{y, Toss} (Electricity sent out by Toss HEP) has been incorporated in the Annex-1 of the MR.		
DOE Assessment #1	The MR version 2 ^{/MR2/} is found to have included the parameter EG _{y, Toss} (electricity from Toss injected at the Malana yard) as per the revision in the monitoring plan dated 07/12/2009. The parameter EG _{y, Toss} is found to be appropriately explained, and is in conformity with the observations during the site visit.		
Conclusion	☐ To be checked during the next periodic verification ☒ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements		

Final Assessment

Monitoring report^{/MR2/} is now revised as per the corrections requested. Monitoring report^{/MR2/} is transparent and now clearly refers the revised monitoring plan^{/RMP/}. The Verification team concludes confidently that the reporting and monitoring procedures^{/MR2/ /XLS2/} are in line with the requirements of the monitoring plan of the validated PDD^{/PD/}, the revised monitoring plan^{/RMP/} as well as with the applied methodology ACM0002, Version 6. The monitoring parameters are recorded as per the monitoring plan and methodology^{/ACM0002/} and calibration certificates for energy meters were verified by the verification team^{/CAL/}.

3.4 Accuracy of emission reduction calculations

Description

- The approved CDM baseline and monitoring methodology ACM0002 version 06^{/ACM0002/}, is applied to the project activity. GHG emission reduction is calculated as baseline emission minus project emission.

- The formula and emission factor used in the calculations of emission reductions are in accordance to the approved methodology ACM0002, Version 6 and monitoring plan of the validated VCS V01 PDD^{/PD/} and the revised monitoring plan^{/RMP/}.
- Baseline emission is net electricity delivered to the grid multiplied with emission factor (EF), in compliance with ACM0002 version 06. EF is calculated ex-ante as 0.750 tCO₂e/MWh.
- As referred in section 3.2 and 3.3, the calibration frequency is defined as once in one year as per third periodic verification report^{/VER3/}. The calibration certificates of all the meters (including spare meters) were checked and calibration was found to be within one year in all the cases.
- The generation records were found to be of adequate quality. The verification team has cross checked the net electricity exported to the grid with the measurements observed at plant's generation and transmission (outgoing) points. The readings were found within the limit.
- Moreover the verification team has interviewed the HPSEB engineers at Bajaura sub station^{/IM03/} and understood the net electricity supplied to the grid is recorded daily and weekly. The data will be sent to higher authorities and also there is mechanism of weekly billing. Moreover, apportioning was further discussed, and it was observed that the HPSEB was closely monitoring the generation data and apportioning details to a satisfactory level.
- During the site visit, the verification team has verified the daily, weekly and monthly generation reports to cross check the reliability of data and were satisfied.
- The set of calculations for the actual emission reduction of the 5th verification period (01/10/2009 to 31/03/2010) are transparently computed and presented in the spread sheet of VER calculation^{/XLS2/} with the reference sources of data. A correct and appropriate grid emission factor in accordance validated VCS v01 PDD^{/PD/} is applied. The sources of project specific electrical energy generation data were cross-checked with the JMR reports^{/JMR//LOG/} and found to be correctly applied.

Nevertheless the following CARs were raised which were successfully closed.

Related Findings

- ☐ No CARs, CLs or FARs have been identified in this context
- ☒ The following finding have been addressed:

Finding: Accuracy of ER calculations		3.4.1		
Classification	☒ CAR	☐ CL	☐ FAR	
Description of finding	The Emission reduction spread sheet should transparently demonstrate how auxiliary power and transmission losses are calculated. The steps shall also be included in the ER spread sheet, with proper references.			
Corrective Action #1	To demonstrate the transparency in the calculation of auxiliary power and transmission losses, A work sheet named “ Malana Gen Details” has been incorporated in the ER sheet with proper references.			
DOE Assessment #1	The worksheet ‘Malana Gen details’ which has been included in emission reduction spread sheet version 2 ^{/XLS2/} has been checked. The data has been found to be in conformity with the JMR sheets and the HPSEB approved apportioning formula. The CAR is closed.			
Conclusion	☐ To be checked during the next periodic verification ☒ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements			

Final Assessment

The CAR as described above is appropriately and satisfactorily corrected by the PP. The emission reduction spread sheet is now transparent and clearly referenced. The excel sheets were rigorously cross checked with the archived monitored data and no discrepancies were found. All the formulae have been found to be correctly applied in the emission reduction calculations. Thus, the verification team is confident that the ER calculation is correct and accurate.

3.5 Quality of evidence to determine emission reductions

Description

- Several documents were submitted by the project proponent as evidence to determine emission reductions which form apart of Table 5-1.
- All energy generation reports^{/JMR/} are duly signed by the authorised signatory from the HPSEB-Bajaura sub-station. All third party calibration reports are also found valid in the current verification period. These documents were verified through site

visit interviews^{/IM01//IM02//IM03/} and found to be authentic.

- Apart from the documents there is an electronic device i.e. Data collection device (DCD) found to be in place. DCD records the data in the electrical format from the meters and this data is archived electronically.
- This recorded data was verified on sample basis and found to be matching with the other recorded data. The net electricity supplied to the grid, gross generation and energy measured at outgoing point are collected using the DCD as stated above which completely avoids the manual errors. Moreover the net electricity generated was cross checked with the formula for apportioning and found that measured energy is found matching after deducting the normally observed transmission losses.
- Furthermore competent employees are recruited, who are found knowledgeable not only about the plant operations but also ensuring the quality of the data and recording and maintaining^{/IM01/}.
- The verification team finds the quality to be of adequate level to assure confidence in the accurate quantification of the emission reductions.
- However the following CAR has been raised, which is due to lack of transparent description in the MR version 1. This was later closed successfully.

Related Findings

☐ No CARs, CLs or FARs have been identified in this context

☒ The following finding(s) have been addressed:

Finding: Monitoring system	3.5.1		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding	Quality assurance and quality control in Annex I of the MR version 1 lacks the following: - Details and forms of data archiving and control. - Procedures of cross checking the generation data for quality assurance.		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	- Details and forms of data archiving and control have been incorporated in Annex-1 of the MR - Procedures of cross checking the generation data for quality assurance has been incorporated in Annex-1 of the MR		
DOE Assessment #1	1. Data archiving and control has been found to be elaborated in Annex I of MR Version 2 ^{/MR2/} .		

	2. The procedure for cross checking the generation data for quality assurance has been found to be added in the MR Version 2^{/MR2/}. Data archiving and quality assurance procedures were verified during the site visit and consequent interviews^{/IM01/}. The description in the MR in annex I are in conformity with actual practices. The CAR is closed.
Conclusion	☐ To be checked during the next periodic verification ☒ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements

Final Assessment

Documents used as evidences for input values of ER calculation were assessed and found to be reliable and authentic. The verification team concludes that the evidence and the data are of acceptable level of quality.

3.6 Management and operational system

Description

- During the verification site visit it was found the operational structure and operation of the structure is found as stated in the monitoring plan of the VCS v1 PDD, revised monitoring plan^{/RMP/} and the monitoring report.
- Moreover the competent staff is employed to ensure the data quality as discussed in section 3.5.
- As stated in the monitoring plan of the validated VCS v1 PDD, internal audits were conducted and the reports were made available during verification^{/LOG/}.
- An operational structure is established with responsibilities identified. Personnel are also sent for training as against the identified requirements.
- Data collection, measurement, calibration, recording and archiving was found to be carried out as per the monitoring plan as described in the validated VCS V01 PDD^{/PD/} and the revised monitoring plan^{/RMP/}.
- The weekly and monthly summary report is submitted to the head office located at Noida, Uttar Pradesh.
- The validation team is satisfied with the management and operational system.

Related Findings

- ☒ No CARs, CLs or FARs have been identified in this context
- ☐ The following finding(s) have been addressed:

Final Assessment

No discrepancy was identified from the designed management and operation system as described in the validated VCS V01 PDD^{PD/}. The monitoring report^{MR2/} clearly describes the management and operational system for the current monitoring period.

4 VERIFICATION STATEMENT

Malana Power Company Limited has commissioned the TÜV NORD JI / CDM Certification Program to carry out the fifth verification of the Project “86 MW Hydro Project in Himachal Pradesh” in Jari village in Kullu district of Himachal Pradesh, India with regard to the requirements of VCS 2007.1 Standard^{/VCS/}.

The project activity involves generation of electricity by using the renewable energy source (hydro) for a grid system in the state of Himachal Pradesh, India. Thus the project activity displaces electricity and green house gas (GHG) emissions currently produced by fossil fuel-burning power plants. The generated electricity by the project activity is being exported to the Northern regional grid (now a part of NEWNE grid) in India.

Reporting period: From 01/10/2009 to 31/03/2010.

In the course of the verification five (05) Corrective Action Requests (CARs) were raised. One (01) Forward Action Request (FAR) from the previous verification was opened. All these CAR and FAR were successfully closed.

The verification is based on the draft monitoring report^{/MR1/}, revised monitoring report^{/MR2/}, the monitoring plan as set out in the validated VCS V01 PDD^{/PD/}, the revised monitoring plan^{/RMP/}, emission reduction calculation spreadsheet^{/XLS1//XLS2/}, the validation report^{/VAL/}, the previous verification reports, and supporting documents^{/LOG//CAL//TRG//JMR/} made available to the TÜV NORD JI/CDM CP by the project participant.

In detail the conclusions can be summarised as follows:

- All operations of the project are implemented and installed as planned and described in the validated project description.
- The monitoring plan is in accordance with the applied approved methodology, ie, ACM0002/Version 06.
- The installed equipments essential for measuring parameters required for calculating emission reductions is calibrated appropriately.
- The monitoring system is in place and functional. The project has generated GHG emission reductions.

As the result of the 5th periodic verification, the verifier confirms that the GHG emission reductions are calculated without material misstatements in a conservative and appropriate manner. TÜV NORD JI/CDM CP herewith confirms that the project has achieved emission reductions in the above mentioned reporting period as follows:

Project emissions: 00 t CO₂ equivalents

Baseline emissions: 45,737 t CO₂ equivalents

Emission reductions: 45,737 t CO₂ equivalents.

The monitoring period has been split into two parts and the verified emission reductions

- from 01-10-2009 to 10-03-2010 (approximately 05:42 PM) is 40,000 tCO₂e
- from 10-03-2010 (approximately 05:43 PM) to 31-03-2010 is 5,737 tCO₂e
- totalling to 45,737 t CO₂ equivalents for the monitoring period.

New Delhi, 2010-04-27

A handwritten signature in black ink, appearing to read 'Archak Pattanaik', written in a cursive style.

(Archak Pattanaik)
TUV India Pvt. Ltd.
Verification Team Leader

Essen, 2010-05-14

A handwritten signature in black ink, appearing to read 'Rainer Winter', written in a cursive style.

(Rainer Winter)
TÜV NORD JI/CDM Certification
Program
Final Approval

5 REFERENCES

Table 5-1: Documents provided by the project participant

Reference	Document
/CAL/	1. Calibration records for the generation, transmission and sub station energy meters for the monitoring period from 01/10/2009 to 31/03/2010. 2. Calibration records for the meters at the Toss injection point at Malana yard for the monitoring period from 01/10/2009 to 31/03/2010. 3. Details of changes in the trivector meters at generation, injection, substation points and the Toss injection point during the monitoring period.
/INV/	1. Sample monthly invoice copies to cross check the energy supplied to the grid. 2. Sample weekly invoice copies to cross check the energy supplied to the grid.
/RMP/	Revised monitoring plan dated 07/12/2009 approved during the fourth periodic verification.
/JMR/	1. Monthly Joint Meter Reading (JMR) certificates of Malana HEP indicating main and check meter numbers and the energy generated at the site and that injected at Sarabai Sub-station at Bajaura by HPSEB covering entire reported monitoring period (01/10/2009 to 31/03/2010), including the auxiliary consumption and transmission losses. 2. Weekly Joint Meter Reading (JMR) certificates of Malana HEP indicating main and check meter numbers and the energy generated at the site and that injected at Sarabai Sub-station at

Reference	Document
	Bajaura by HPSEB covering entire reported monitoring period (01/10/2009 to 31/03/2010), including the auxiliary consumption and transmission losses. 3. Joint meter readings of Toss HEP covering entire reported monitoring period (01/10/2009 to 31/03/2010)
/LOG/	1. Sample of daily log book records showing Malana HEP generation. 2. Sample of weekly data from the Data Collecting Device (DCD). 3. Sample of daily reports sent to the head office (HO). 4. Records of the electricity from the Toss Hydro project injected at Malana yard from 01/10/2009 to 31/03/2010.
/MR1/	Monitoring Report "86 MW Hydro project in Himachal Pradesh" for the period 01/10/2009 to 31/03/2010.
/MR2/	Final monitoring Report "86 MW Hydro project in Himachal Pradesh" for the period 01/10/2009 to 31/03/2010.
/OUT/	Details of the outages occurred during the monitoring period.
/PHOTO/	Photographs of the site visit.
/PD/	Project design document validated by TUV Nord Cert GmbH as per VCS V01, dated 25/12/2006.
/XLS1/	Emission reduction calculation spread sheets provided by the project

Reference	Document
	participant explaining the emission reductions achieved during the monitoring period (related to MR1).
/XLS2/	Final emission reduction calculation spread sheets provided by the project participant explaining the emission reductions achieved during the monitoring period (related to MR2).

Table 5-2: Background investigation and assessment documents

Reference	Document
/ACM0002/	ACM0002: "Consolidated baseline methodology for grid connected electricity generation from renewable sources" (Version 6 dt. 2006-05-19)
/CPM/	TÜV NORD JI / CDM CP Manual (incl. CP procedures and forms)
/CON/	The signed contract between TUV NORD and Malana Power Company Limited for carrying out verification of voluntary emission reduction dated 23/03/2010.
/CEA/	CO2 Baseline Database for the Indian Power Sector, December 2006, published by Central Electricity Authority, Ministry of Power, Government of India
/IPCC/	1996 IPCC Guidelines for National Greenhouse Gas Inventories: work book 2006 IPCC Guidelines for National Greenhouse Gas Inventories:

Reference	Document
	work book
/ISO 14064/	- Greenhouse gases -- Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals - Greenhouse gases -- Part 2: Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements - Greenhouse gases -- Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions
/VAL/	Validation Report and opinion for the project "86 MW Hydro Project in Himachal Pradesh" issued by TUV Nord, Report number 53213807-07/36 dated 2007-04-25
/VER3/	3rd Periodic Final Verification Report No. 53206509-09/166-V03 for the CDM project: "86MW Hydro Project in Himachal Pradesh" for the period 2008-04-01 to 2009-03-31, dated 26-May-2009.
/VER4/	4th Periodic Final Verification Report No. 8106120200-09/498-V04 for the CDM project: "86MW Hydro Project in Himachal Pradesh" for the period 2009-04-01 to 2009-09-30, dated 07-Dec-2009.
/VCS/	Voluntary Carbon Standard 2007.1; Program Guidelines; VCSA Rules ;and VCS Guidance Document
/VVM/	CDM Validation and Verification Manual (Version 1.1 as per EB 51)

Table 5-3: Websites used

Reference	Link	Organisation
/cea/	www.cea.nic.in	Central Electricity Authority, India
/iso/	www.iso.org/iso/en	The International Organisation for Standardisation
/ieta/	www.ieta.org	International Emissions Trading Association
/mpcl/	http://www.malanamodelhep.com/	Malana Power Company Limited
/unfccc/	http://cdm.unfccc.int	UNFCCC-CDM
/VCS/	www.v-c-s.org	The Voluntary Carbon Standard

Table 5-4: List of interviewed persons

Reference	MoM 1		Name	Organisation / Function
/IM01/	V	☒ Mr. ☐ Ms.	J. K. Beri	Malana Power Company Limited- General Manager, Operation& Maintenance
/IM01/	V	☒ Mr. ☐ Ms.	M. A. Rafiq	Malana Power Company Limited- Assistant Manager-Electrical

Reference	MoM 1		Name	Organisation / Function
/IM01/	V	☒ Mr. ☐ Ms.	Chandan Singh	Malana Power Company Limited- Electrical Engineer
/IM02/	V	☒ Mr. ☐ Ms	Satyapal Singh	Emergent Ventures India Private Limited, Consultant
/IM03/	V	☒ Mr. ☐ Ms.	Pankaj Upadhyay	Electrical Engineer (A.E.), HPSEB, Bajaura substation
/IM03/	V	☒ Mr. ☐ Ms.	Ram Lok	Add. Junior Engineer, HPSEB, Bajaura substation
/IM03/	V	☒ Mr. ☐ Ms.	Hemchand	HPSEB, Toss Injection point at Malana yard.

1) Means of Interview: (Telephone, E-Mail, Visit)