



Voluntary Carbon Standard Version 2007.1

Verification Report

Report No: 8106120200-09/498 V04

Name of Verification company:	Date of the issue:
TÜV NORD CERT GmbH	2009-12-07
Report Title:	Approved by:
86 MW Hydro Project in Himachal Pradesh V04	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 fourth 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 is generation of electricity by installation of renewable hydropower project to displace electricity generated by fossil fuel based thermal power plants in Northern regional Grid (now NEWNE grid), thus achieves GHG emission reduction. A risk based approach has been followed to perform this verification. In the course of the verification 4 Corrective Action Requests (CAR) were raised and successfully closed. 2 Forward Action Requests (FAR) were raised which shall be checked in next verifications. The verification is based on the validated V01 PDD^{/PDD/}, VCS1 Validation report^{/VAL/}, monitoring report^{/MR1//MR2/}, subsequent verification reports^{/VER/} and other supporting documents made available to the verifiers by project proponent. Taking into account of the validation of the VCS PD and subsequent verifications, the verifiers confirm that: The GHG emission reduction in the reported monitoring period (01/04/2009 to 30/09/2009) is: 181,223tCO₂e.	
Work carried out by:	Number of pages:
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1 Introduction

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^{/PDD/};
- To confirm that the monitoring system is implemented and fully functional to generate voluntary carbon units (VCUs¹/VERs) 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 VCS project is based on the validated VCS v1 project design document^{/PDD/}, the monitoring report^{/MR1//MR2/}, supporting documents made available to the verifier and information collected through performing interviews 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

The purpose of the project activity is to generate electricity by using the renewable energy source (hydro) for a grid system in the state of Himachal Pradesh, India. 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.

The project is located at Jari village in Kullu district of Himachal Pradesh, about 25 Km from Bhunter, the nearest airport. The project power house coordinates are uniquely identified as: Latitude-32 degrees 0.2 minutes

¹ As per VCS, Verified Emission Reductions (VERs) are considered to be VCUs only after the successful registration in an approved VCS registry.

north; Longitude-77 degrees 14.5 minutes east. The nearest railway station from the project site is Kiratpur Sahib, about 198 Km from Bhunter.

The electricity generation facility is installed on Malana Nallah, a tributary of Pārbati River. The project activity entails installation of two turbines of capacity 43MW each along with other auxiliary devices at Jari village, Kullu District, Himachal Pradesh.

The project activity has the capacity to generate about 370 million units per annum and this estimation is based on 95% power plant availability for a 90% dependable year based on the hydrological data for the last 24 years provided by the Government of Himachal Pradesh.

The achieved annual GHG emission reduction during the crediting period is **181,223 tCO₂e**.

1.4 Level of assurance

The verification report is based on VCS v1 PDD^{/PDD/}, monitoring report^{/MR1//MR2/}, supporting documents made available to the verifier and information collected through performing interviews and during the on-site assessment. The verification opinion is assured through the credibility of all documents checked.

2 Methodology

The verification of the project was carried out from 2009-10-13 to 2009-12-03.

Preparations: 2009-10-13 to 2009-10-20

On-site verification: 2009-10-26 to 2009-10-27

(Draft) Reporting: 2009-11-03

(Final) Reporting: 2009-12-07

The verification consisted of the following steps:

- A desk review of the VCS v1 PDD^{/PDD/} and the monitoring plan;
- A desk review of the Monitoring Report^{/MR1/} and additional supporting documents which were submitted by the client.
- Verification audit planning,
- On-Site assessment,

- Background investigation and follow-up interviews with personnel of the project developer
- Verification reporting (Draft Verification Report and Final Verification Report).

The criteria of this verification include the relevant rules and steps as set out in the VCS 2007.1.

3 Verification Findings

The verification findings have been summarised in the table below.

Table 3.1: Verification Findings.

Verification topic	No. of CAR	No. of FAR	No. of CL
R- Remaining issues, including any material discrepancy, from previous validation	–	–	–
I- Project Implementation	01	01	–
C – Completeness of Monitoring	01	01	–
A – Accuracy of Emission Reduction Calculations	02	–	–
Q- Quality of Evidence to Determine Emission Reductions	–	–	–
M- Management and Operational System	–	–	–
SUM	04	02	–

3.1 Remaining issues, including any material discrepancy, from previous validation.

There are no remaining issues including any material discrepancy, from the previous validation.

3.2 Project Implementation

To a large extent, the project has been implemented as described in the project Design Document^{/PDD/} as per VCS v1 and is grandfathered to VCS 2007.1^{/VCS/}. There are some

changes though, against which CARs have been raised and successfully closed. One FAR has been raised which shall be checked during the next verification. However there is no change in the key equipments.

During the monitoring period covering 01/04/2009 to 30/09/2009 the project displaced 241,634 MWh electricity of Northern regional grid in India (which is now the NEWNE grid). 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.

However it was learnt from the site visit and documentary review that from 11/08/2009, the electricity being produced from Toss Hydroelectric power project (upstream of Malana HEP) is being injected at the electricity yard at Malana HEP under Government orders. Toss HEP has installed calibrated meters at the yard from where the joint meter readings of Toss HEP are taken. Now the lines from Malana HEP carries electricity generated from Toss HEP also. The meters at the substation now record the readings of both Toss and Malana HEP. It has been found that Himachal Pradesh State Electricity Board (HPSEB) has implemented a formula to apportion the exact amount of electricity generated from Malana HEP. Thus the measurement of electricity generated from Malana HEP deviates from the monitoring plan of the validated PDD. A CAR (D1) has been raised against this and subsequently closed. A FAR (D4) also has been raised in this regard which shall be checked in the next verification. Moreover an amendment to the monitoring plan of the PD was made to describe the deviation in detail^{/RMP/}.

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 except the deviation in the measurement of the electricity generated^{/PDD/}.

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. This has been checked from the site visit, interviews of key persons^{/IM01/} and verification of the calibration certificates^{/CAL/}.

The following CAR was raised in the context of the deviation in the calibration frequency, which were subsequently closed. A FAR was also raised which shall be checked during the next verification.

Finding: Project Implementation	I1		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding	During site visit it was observed that the electricity from the Toss hydro project is injected into the Bajaura transmission line from Malana w.e.f 11/08/2009. It has been evidenced from the document review and the interviews that the energy meter at the substation, which was earlier exclusively for net electricity, exported to the grid from Malana is now measuring the net electricity exported form Toss as well. Thus the net electricity supplied to the grid from Malana is now calculated and not directly measured. This deviates from the monitoring plan as in annex IV of the validated VCS V1 PDD.		
Corrective Action #1	The energy meters at the Bajaura substation are owned and maintained by HPSEB (Himachal Pradesh State Electricity Board). With effect from 11/08/09 Toss hydro project was also allowed to inject electricity into the Bajaura transmission line by HPSEB. Hence the meters at the substation which were earlier measuring the electricity export only from MPCL, are now measuring combined export of MPCL and Toss hydro projects. The net electricity export by MPCL and		

Finding: Project Implementation	I1																																												
	Toss are calculated and certificates of the same are provided by HPSEB. The calculation procedure of Gross electricity generation, Auxiliary consumption, transmission losses and the net power export by the project activity is provided in the table below. <table><tr><th>Sr. No.</th><th>Particulars</th><th>Tool for measurement</th><th>Source</th></tr><tr><td>1</td><td>Malana Generation</td><td>Meter-at-Malana</td><td>Actual from JMR Reading</td></tr><tr><td>2</td><td>Energy sent out by Toss</td><td>Meter in Toss incoming line</td><td>Readings Being recorded by HPSEB</td></tr><tr><td>3</td><td>Total Energy sent out by Malana and Toss ((Toss incoming line is at the Malana yard)</td><td>Meter at Malana - BUS</td><td>Actual from JMR Reading</td></tr><tr><td>4</td><td>Auxiliary Consumption by Malana</td><td>Calculations =(1+2 -3)</td><td>Readings at 1,2,&3</td></tr><tr><td>5</td><td>Energy sent out by Malana</td><td>Calculations =(1 - 4)</td><td>Readings at 1,2</td></tr><tr><td>6</td><td>Energy Injected at Bajoura</td><td>Meter-at- Bajoura</td><td>Actual from JMR Reading</td></tr><tr><td>7</td><td>Transmission losses up to Bajoura (Total)</td><td>Calculations =(6-3)</td><td></td></tr><tr><td>8</td><td>Share of losses –Malana</td><td colspan="2">Calculations =[Total losses (7) x Power sent out by Malana (5)] / [Total power sent out Malana +Toss (3)]</td></tr><tr><td>9</td><td>Share of losses -Toss</td><td colspan="2">Calculations =[Total losses(7) x Power sent out by Toss(2) / [Total power sent out Malana +Toss (3)]</td></tr><tr><td>10</td><td>Energy injected by Malana HEP at Bjaura Substation</td><td colspan="2">Calculations = [Malana Generation (1) – Auxiliary Consumption by Malana (4) – Share of losses Malana (8)]</td></tr></table> Reference: Authenticated Letter issued by HPSEB,12 Oct, 2009. Hence by above mentioned method electricity exported to grid by MPCL can be very accurately calculated therefore deviation from Monitoring plan of the PDD does not have any impact of on VER estimations. HPSEB also endorses the above mentioned calculation procedure and the calculated generation figures arrived at. Certificate for the same has been provided to the DOE. Therefore the deviation does not negatively impact the conservativeness of the applied methodology's (ACM0002, Ver 06) criteria and procedures to quantify data leading to GHG emission reductions or removals. Hence as per the clause no. 5.3 of the Voluntary Carbon Standard 2007.1 this deviation from the validated monitoring plan do not impact negatively on the conservativeness of	Sr. No.	Particulars	Tool for measurement	Source	1	Malana Generation	Meter-at-Malana	Actual from JMR Reading	2	Energy sent out by Toss	Meter in Toss incoming line	Readings Being recorded by HPSEB	3	Total Energy sent out by Malana and Toss ((Toss incoming line is at the Malana yard)	Meter at Malana - BUS	Actual from JMR Reading	4	Auxiliary Consumption by Malana	Calculations =(1+2 -3)	Readings at 1,2,&3	5	Energy sent out by Malana	Calculations =(1 - 4)	Readings at 1,2	6	Energy Injected at Bajoura	Meter-at- Bajoura	Actual from JMR Reading	7	Transmission losses up to Bajoura (Total)	Calculations =(6-3)		8	Share of losses –Malana	Calculations =[Total losses (7) x Power sent out by Malana (5)] / [Total power sent out Malana +Toss (3)]		9	Share of losses -Toss	Calculations =[Total losses(7) x Power sent out by Toss(2) / [Total power sent out Malana +Toss (3)]		10	Energy injected by Malana HEP at Bjaura Substation	Calculations = [Malana Generation (1) – Auxiliary Consumption by Malana (4) – Share of losses Malana (8)]	
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Finding: Project Implementation	I1
	the VCS Program approved methodology's criteria and procedures to quantify data leading to GHG emission reductions or removals.
DOE Assessment #1	The verification team has checked the apportioning methodology. Interviews of HPSEB personnel was also conducted to ensure the accuracy of the readings and apportioning^{/IMO3/}. Further the monitoring of the Toss generation was rigorously studied. The conclusion of the verification team is as follows: 1. The injection of electricity generated from Toss HEP into Bajaura line from Malana HEP is as per the HPSEB agreement with MPCL. 2. The generation from Toss HEP is based on the JMR readings at the Bajaura injection point at Malana HEP yard. The meters (main and check) were found to be calibrated as per the HPSEB norms. HPSEB has appointed government personnel to record the readings from Toss at an hourly basis, which was witnessed during the site visit. The recordings and archiving is satisfactory. 3. HPSEB approved the formula for apportioning of electricity between Malana and Toss HEPs. The apportioning formula is found to be devoid of any errors and is acceptable. Calculation of auxiliary consumption and transmission losses are found to be appropriate. 4. HPSEB is found to issue JMR certificates on the basis of this. MPCL raises invoices on the basis of these JMRS. 5. The emission reduction calculations are based on the JMR certificates issued by HPSEB. 6. The verification team is confident that the apportioning has resulted in no overestimation of electricity generated from Malana

Finding: Project Implementation	I1
	HEP in any way. Since the deviation shall not Impact negatively on the conservativeness of the applied methodology and procedures to quantify data lading to GHG emission reductions or removals, the deviation in the measurement process is allowed. However a FAR has been raised to ensure continued monitoring of all the meters including those not under direct control of MPCL like meters at Toss injection point. The revised monitoring plan is submitted by the PP and found to be acceptable. /RMP/
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: Project Implementation	I2
Classification	☐ CAR ☐ CL ☒ FAR
Description of finding	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 and the revised monitoring plan has to be considered during every verification. Periodic calibration of the trivector meters at injection point of Toss hydro project has to be ensured for the next verifications.
Corrective Action #1	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

Finding: Project Implementation	I2
	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.
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

3.3 Completeness of Monitoring

The reporting^{/MR1//MR2/} is in line with the requirements of the validated monitoring plan of the VCS V1 PDD^{/PDD/} as well as with the applied methodology ACM0002 (version 06)^{/ACM0002/}.

The reporting procedures reflect the requirements of the monitoring plan^{/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 archiving has been found to be done both electronically and on paper. The daily generation records are archived at site, and compiled into weekly generations. These records are also sent to the head office of MPCL for archiving^{/IM01/}.

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 were found to be well trained. Personnel also were found to be sent on training to other parts of Asia, which also includes training in certain software to improve the monitoring of the generation data^{/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 v1 PDD and methodology ACM0002. Thus the DOE confirms the completeness of the monitoring in the key areas.

- As referred in section 3.2, the calibration frequency is defined as once in one year as per final verification report^{/VER/}. 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^{/CAL/}.

However the following CAR was raised and subsequently closed successfully. A FAR was also raised which shall be checked during the next verification.

Finding: Completeness of Monitoring	C1		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding	The MR should contain a description of the following: 1. The details of outages with reasons. 2. Comparison between the emission reductions projected in the PDD and the emission reductions achieved during the monitoring period. 3. Details of the meters used and their frequency and detail of meter calibration.		
Corrective Action #1	The MR has now been revised to include the following: 1. Section 6 now contains the details of outages with reasons. 2. Comparison between the emission reductions projected in the PDD and the emission reductions achieved during the monitoring period has now been provided under section 8 of the revised MR. 3. Details of the meters used and their frequency and detail of meter calibration has been included under section 7 of the revised Monitoring Report.		
DOE Assessment #1	1. The MR now has details of outages during the monitoring period in detail^{/OUT/}. This CAR is closed. 2. A comparison between the actual and		

Finding: Completeness of Monitoring	C1
	ex-ante ER is found to be provided in section 8. However the justification needs to be strengthened in the MR. 3. The details of meter checking and frequency of monitoring does not include details of stand-by meters.
Corrective Action #2	2. The justification regarding the comparison between actual and ex-ante emissions has now been modified. 3. The details of calibration now include the spare meters also at Malana.
DOE Assessment #2	2. The emission reductions during the monitoring period (01-04-2009 to 30-09-2009) has been calculated to be 181,223 tCO₂e. As per PDD^{/PDD/}, the annual ex-ante emission reduction is 272,849 tCO₂e. For six months this would be 136,424 tCO₂e. However, the verification team has studied the generation reports of the last three years and found that maximum generation of the plant is during the months between June and September during the monsoon, owing to high run off. The total generation for the last three years has followed the same pattern, where the generation drops to minimum during winter, and peaks during monsoon. As the verification has been done during the monsoon season, this has resulted in higher emission reductions. So, the verification team is convinced on the justification of higher emission reductions accrued for the six months of monitoring. 3. Section 7, meter calibration was checked. It is now found to have details of spare meters also.
Conclusion	☐ To be checked during the next periodic verification ☒ Appropriate action was taken

Finding: Completeness of Monitoring	C1
	☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements

Finding: Completeness of Monitoring	C2²		
Classification	☐ CAR	☐ CL	☒ FAR
Description of finding (raised during the 3rd verification)	In the context of CAR 1 ² the frequency of calibration of the energy meters shall be defined by the project participant and it shall be verified during the next periodic verifications.		
Corrective Action #1	The calibration frequency would be annual and the calibration certificates of all energy meters would be made available to DOE for verification.		
DOE Assessment #1 (3rd Verification)	The above corrective action is deemed appropriate.		
DOE Assessment #2 (present verification)	During the 4th verification site visit, it was observed that the frequency of calibration of all the meters are taken due care. Two new meters also have been found to be purchased to ensure calibration of meters at least once every year. The calibration certificates of the trivector meters have been checked and have been found to be satisfactorily within one year. This FAR is closed. However a note has to be added in the MR on the FARs raised during the last verification and how they were addressed during the present monitoring period.		
Corrective Action #2	A note has been incorporated in the revised MR under Annex-2. Accounting FAR raised in the last verification in the current Monitoring period: Calibration frequency of the energy meters have been maintained on		

² Raised during the 3rd verification; refer verification report number 53206509-09/166 dated 26 May 2009

Finding: Completeness of Monitoring	C2 ²
	annual basis by the PP and the calibration certificates have been made available to the DOE. Six spare meter have been kept to replace installed meters during calibration or failures of meters.
DOE Assessment #3 (present verification)	MR ^{/MR2/} has been found to be modified. The FAR raised during the last (3rd) verification and the measures taken against it have been found to be in place in Annex 2 in the MR ^{/MR3/} .
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

3.4 Accuracy of Emission Reduction Calculations

- 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 and leakage.
- Baseline emission is net electricity delivered to the grid multiplied with emission factor (EF), in compliance with ACM0002 version 06. EF is calculated as 0.750 tCO₂e/MWh.
- 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^{/LOG/}. The readings were found within the limit.
- Moreover the verification team has interviewed the local electricity board engineer^{/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^{/LOG/}.
- Thus the verification team is convinced that the net electricity supplied to the grid and the generation reading^{/JMR/} are of adequate quality though apportioning is being done. Moreover the energy meters were calibrated by Electronics Regional Test Laboratory (North), which is an authorised testing and calibration laboratory^{/CAL/}.
- It was verified in the course of this verification that the above mentioned methodology has been correctly and accurately applied in calculating the total emission reductions and the emission reduction calculation is accurate and conservative.

Nevertheless, the below mentioned CARs was raised which was subsequently resolved.

Finding: Accuracy of ER calculations	A1		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding	The MR should clearly describe how auxiliary power and transmission losses are calculated. The steps shall also be included in the ER excel sheet, with proper references.		
Corrective Action #1	Description of calculation procedure for auxiliary consumption and transmission losses have been provided in the tabulated formats in the MR under section 5.3 and the excel sheet		
DOE Assessment #1	MR ^{/MR3/} is now updated and correct calculation procedures for auxiliary consumption and transmission losses have been found to be provided. 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: Accuracy of ER calculations	A2		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding	The emission reduction calculations have not been rounded down. Needs correction.		
Corrective Action #1	The emission reduction calculations have now been rounded down in the revised MR and VER Estimation sheet.		
DOE Assessment #1	The emission reductions have been found to have rounded down in the excel sheets. The figures are also found to be appropriately referenced. The ER calculations have been corrected accordingly. The consistency of values between PD and the ER calculation sheet has been checked and found to be correct. 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		

3.5 Quality of Evidence to Determine Emission Reductions

Several documents were submitted by the project proponent as evidence to determine emission reductions which form apart of Table 5-1. 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 formulation for apportioning on gross generation and the energy measurements observed at outgoing point 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/}.

As discussed in the above Para and referred in section 3.2 and 3.4 the quality is found of appropriate quality. Hence the verification team concludes that the evidence and the data are of good quality.

3.6 Management and Operational System

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 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 was established with responsibilities identified. A monitoring mechanism was found to be in place by HPSEB. Personnel are also sent for training as against the identified requirements^{/TRG/}. This was checked and deemed to be ok.

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.

4 Verification conclusion

The scope of this verification covers the determination of voluntary greenhouse gas emission reductions generated by the above mentioned project. The verification is based on the validated V01 PDD^{/PDD/}, VCS1 Validation report^{/VAL/}, monitoring report^{/MR1//MR2/}, subsequent verification reports^{/VER/} and other supporting documents made available to the verifiers by project proponent.

As a result of the verification, the verifier confirms that:

- All operations of the project are implemented and installed as planned and described in the project design document^{/PDD/}. The monitoring system is in place and functional. The installed equipment essential for generating emission reductions runs reliable.
- The monitoring plan is in accordance with the applied approved CDM methodology, i.e., ACM0002:

"Consolidated baseline methodology for grid connected electricity generation from renewable sources" (Version 6 dt. 2006-05-19).

- The installed equipment essential for measuring parameters required for calculating emission reductions are calibrated appropriately.
- The monitoring system is in place and functional. The project has generated GHG emission reductions

As a result of the monitoring period, the verifier confirms that GHG emission reductions are calculated without material misstatements in a conservative and appropriate manner. Also all the documents checked during on-site visit and verification process will be kept confidential and will not be disclosed at any time other than the Project Proponent consent as required by VCSA.

Monitoring period: 2009-04-01 to 2009-09-30 including both days.

Verified emission reductions generated in the above mentioned monitoring period:

<i>Project emissions</i>	<i>00</i>	<i>t CO₂ equivalents</i>
<i>Baseline emissions</i>	<i>181,223</i>	<i>t CO₂ equivalents</i>
<i>Emission reductions</i>	<i>181,223</i>	<i>t CO₂ equivalents</i>



Pankaj Patel
Verification Team Leader
Essen, 2009-12-07



Rainer Winter
Final approval
Essen, 2009-12-07

Annex I

Abbreviations

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEA	Central Energy Authority
CL	Clarification Request
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
CP	Certification Program
GHG	Greenhouse gas(es)
HEP	Hydro Electric Project
HPSEB	Himachal Pradesh State Electricity Board
JMR	Joint Meter Reading
kW	Kilowatt
kWh	Kilowatt hour
m	Meter
MPCL	Malana Power Company Limited
MR	Monitoring Report
MW	Megawatt
MWh	Megawatt hour
NEWNE	The North-East-West-North East Grid of India
PDD	Project Design Document
QC/QA	Quality control/Quality assurance
UNFCCC	United Nations Framework Convention on Climate Change
VCU	Voluntary Carbon Unit
VER	Verified Emission Reductions

Annex II

Table 5-1: Documents in yellow highlight are yet to be provided by the project participant

Reference	Document
/AUX/	▪ The formula developed by HPSEB to calculate the auxiliary power consumption at MPCL dated 12/10/2009. ▪ The worksheet authenticated by HPSEB giving the auxiliary consumption at MPCL dated 12/10/2009.
/CAL/	Calibration records for the generation, transmission and sub station energy meters for the monitoring period from 2009-04-01 to 2009-09-30.
/CON/	The signed contract between TUV NORD and Malana Power Company Limited for carrying out verification of voluntary emission reduction dated 09/10/2009.
/INV/	▪ Sample monthly invoice copies to cross check the energy supplied to the grid. ▪ Sample weekly invoice copies to cross check the energy supplied to the grid.
/JMR/	▪ Monthly Joint Meter Reading (JMR) certificates 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 (2009-04-01 to 2009-09-30), including the auxiliary consumption and transmission losses. ▪ Weekly Joint Meter Reading (JMR) certificates 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 (2009-04-01 to 2009-09-30), including the auxiliary consumption and transmission losses.
/LOG/	▪ Sample of daily log book records showing

Reference	Document
	hourly generation. - Sample of weekly data from the Data Collecting Device (DCD). - Sample of daily reports sent to the head office (HO).Records of the hourly electricity injected from the Toss Hydro project at Bajaura line from 11/08/2009. Details and schedule of changes in the trivector meters at generation, injection and substation points during the monitoring period.
/MR1/	Monitoring Report "86 MW Hydro project in Himachal Pradesh" for the period 2009 April 01 to 2009 September 30, version 1 dt. 09.10.2009 which forms the basis of verification.
/MR2/	Monitoring Report "86 MW Hydro project in Himachal Pradesh" for the period 2009 April 01 to 2009 September 30, version 2 dt. 05.11.2009 which forms the basis of the verification opinion.
/OUT/	Details of the outages occurred during the monitoring period.
/PHOTO/	Photographs of the site visit.
/RMP/	Revised monitoring plan dated 2009-12-07
/TRG/	Records of the training of the personnel.
/XLS1/	Excel-Calculation sheets provided by the project participant explaining the emission reductions achieved during the monitoring period (related to MR1).
/XLS2/	Excel - Calculation 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)
/CEA/	CO ₂ Baseline Database for the Indian Power Sector, December 2006, published by Central Electricity Authority, Ministry of Power, Government of India (http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm)
/GHG/	The GHG protocol for project accounting; 2005
/ISO/	ISO 14064-3:2006, ISO 14065:2007
/PDD/	Project Design Document for project: “86 MW Hydro Project in Himachal Pradesh” Version 2 dated 2006-12-25
/TN- VOS/	TUV Nord JI/CDM CP voluntary off-set standard.
/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
/VCS/	Voluntary Carbon Standard 2007.1; Program Guidelines; VCSA Rules ;and VCS Guidance Document
/VER/	3 rd Periodic Final Verification Report No. 53206509-09/166-V03 for the VCS project: “86MW Hydro Project in Himachal Pradesh” for the period 2008-04-01 to 2009-03-31, dated 26-May-2009.
/VVM/	CDM Validation and Verification Manual version 01, Annex-3, EB44

Table 5-3: Websites used

Reference	Link	Organisation
/cea/	www.cea.nic.in	Central Electricity Authority, India

Reference	Link	Organisation
/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: Interviewed Persons

Reference	MoI ¹		Name	Organisation / Function
/IM01/	V	☒ Mr. ☐ Ms.	Mr. 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
/IM01/	V	☒ Mr. ☐ Ms.	Chandan Thakur	Malana Power Company Limited- Electrical Engineer
/IM02/	T	☒ Mr. ☐ Ms	Vishal Kumar	Emergent Ventures India Private Limited, Consultant
/IM02/	V	☒ Mr. ☐ Ms	Satyapal Singh	Emergent Ventures India Private Limited, Consultant
/IM03/	T	☒ Mr. ☐	Ashwani Sohail	Himachal Pradesh State Electricity Board, Bajoura, Additional

Reference	MoI ¹		Name	Organisation / Function
		Ms		Assistant Engineer
/IM03/	V	☒ Mr. ☐ Ms	Gambhir Das	Himachal Pradesh State Electricity Board, Bajoura, Junior Engineer
/IM03/	V	☒ Mr. ☐ Ms	Amar Singh	Himachal Pradesh State Electricity Board, Bajoura, SSE (Toss HEP, Bajaura line Injection point)

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