



## **VOLUNTARY CARBON STANDARD 2007.1**

### **VERIFICATION REPORT**

#### **5 MW BRAHM GANGA HYDRO – ELECTRIC PROJECT” AT KULLU DISTRICT OF HIMACHAL PRADESH, INDIA**

**Monitoring Period: 2008-04-02 to 2010-03-31  
(incl. both days)**

**Report No: 8106144531 -10/65**

**Date: 2010-05-10**

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TÜV NORD JI/CDM Certification Program

P-No.: 8106144531 -10/65

Name of Verification company:	Date of the issue:
<b>TÜV NORD CERT GMBH</b>	2010-05-10
Report Title:	Approved by:
5 MW Brahm Ganga Hydro - Electric Project” at Kullu district of Himachal Pradesh, India	Rainer Winter
Client:	Project Title:
Harisons Hydel Construction Co. (P) Limited (HHCCPL)	5 MW Brahm Ganga Hydro - Electric Project” at Kullu district of Himachal Pradesh, India
<b>Summary:</b>	
<p>The verification statement will be provided as part of the final verification report.</p> <p>Harisons Hydel Construction Co. (P) Limited (HHCCPL) has commissioned the TÜV NORD JI/CDM Certification Program to carry out the verification of the project - “ 5 MW Brahm Ganga Hydro - Electric Project” at Kullu district of Himachal Pradesh, India” with regard to the relevant requirements of VCS 2007.1 Standard.</p> <p>The project activity involves installation of 5 MW ( 2 x 2.5 MW) small scale grid connected power generation units. This renewable energy project is based on the run-of-river scheme. The generated electricity will be exported to the NEWNE grid of India. The project started generating commercial power since 2nd April 2008.</p> <p>In the course of the verification 07 Corrective Action Requests (CARs) were raised and closed successfully.</p> <p>The verification is based on the VCS Project design<sup>/VCS PD/</sup>, monitoring report<sup>/MR01/MR02/</sup>, VCS validation report<sup>/VAL-R/</sup> and other supporting documents made available to the verifiers by project proponent.</p> <p>Taking into account the validation of the VCS PD<sup>/VCS-PD/</sup> and VCS Validation report<sup>/VAL-R/</sup> and subsequent verification, the verifiers confirm that:</p> <p>The GHG emission reduction in the reported monitoring period (2008.04.02 to 2010.03.31) is: 38,554 t CO<sub>2</sub>e.</p>	
Work carried out by:	Number of pages:
Mr. Pankaj Patel Mr. Hemang Shah Mr. Saroj Sahoo	30

## Abbreviations

<b>BAU</b>	Business as usual
<b>CA</b>	Corrective Action / Clarification Action
<b>CAR</b>	Corrective Action Request
<b>CDM</b>	Clean Development Mechanism
<b>CO<sub>2</sub></b>	Carbon dioxide
<b>CO<sub>2e</sub></b>	Carbon dioxide equivalent
<b>CP</b>	Certification Program
<b>CL</b>	Clarification Request
<b>DNA</b>	Designated National Authority
<b>EB</b>	CDM Executive Board
<b>EIA</b>	Environmental Impact Assessment
<b>ER</b>	Emission Reduction
<b>FAR</b>	Forward Action Request
<b>GHG</b>	Greenhouse gas(es)
<b>GWP</b>	Global Warming Potential
<b>HPSEB</b>	Himachal Pradesh State Electricity Board
<b>IPCC</b>	Intergovernmental Panel on Climate Change
<b>MP</b>	Monitoring Plan
<b>MR</b>	Monitoring Report
<b>MW</b>	Megha Watt
<b>PLF</b>	Plant Load factor
<b>PP</b>	Project Participant
<b>QC/QA</b>	Quality control/Quality assurance
<b>UNFCCC</b>	United Nations Framework Convention on Climate Change
<b>VCS</b>	Voluntary Carbon Standard
<b>VCS - PD</b>	VCS - Project Description
<b>VCU</b>	Voluntary Carbon Unit
<b>VVM</b>	Validation and Verification Manual

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## 1 INTRODUCTION

The Harisons Hydel Construction Co. (P) Limited (HHCCPL) has commissioned the TÜV NORD JI/CDM Certification Program to carry out the verification of the project: “5 MW Brahm Ganga Hydro – Electric Project” at Kullu district of Himachal Pradesh, India“ with regard to the relevant requirements of the Voluntary Carbon Standard 2007.1<sup>/VCS/</sup>. The verifiers have reviewed the implementation of the monitoring plan (MP) in the registered VCS project for the monitoring period 2008-04-02 to 2010-03-31,

The applied monitoring methodology is AMS ID, V 15 “Grid connected renewable electricity generation (Version 15: 30/10/2009)”.

### 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-PD;
- 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<sup>/VCS-PD/</sup>, the monitoring report<sup>/MR/</sup>, emission reduction calculation spread sheet<sup>/XLS/</sup>, 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

### 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	5 MW Brahm Ganga Hydro – Electric Project” at Kullu district of Himachal Pradesh, India
Project owner	HARISONS HYDEL CONSTRUCTION CO. (P) LIMITED (HHCCPL)
Any specific project categories	<input type="checkbox"/> Mega project (> 10 <sup>6</sup> t CO <sub>2eq</sub> / a) <input type="checkbox"/> Micro project (< 5000 t CO <sub>2eq</sub> / a) <input type="checkbox"/> AFOLU project <input type="checkbox"/> Grouped project <input checked="" type="checkbox"/> No specific project category
VCS PD dated	Draft: 2009-12-09 Final: 2010-03-30
Applied Methodology	AMS ID, v 15
Project starting date	2008-04-02
Crediting period	<input type="checkbox"/> Fixed Crediting Period (10 y) <input checked="" type="checkbox"/> Crediting Period 10 (y) renewable once
Start of crediting period	2008-04-02

### 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:	Manikaran village, District Kullu
Latitude:	32° 02' N
Longitude:	77° 21.20' E.

### 1.3.3 Technical Project Description

The project intends to generate electricity by exploiting the hydro energy potential of the Brahm Ganga Nallah (Tributary of River Parbati) in Kullu District of Himachal Pradesh, India. The project comprises installation of 5 MW ( 2 x 2.5 MW)horizontal axis Francis Turbines coupled with generators. Project activity is a small scale grid

connected power generation units. This renewable energy project is based on the run-of-river scheme. The diversion of the water from brahmganga nallah is done by construction of a diversion weir and allowing water through power tunnel to the project site. The project is currently operational. The project was commissioned on 02/04/2008.

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

**Table 1-3a:** Technical data of the project

Parameter	Value
Diversion Tunnels	
Shape	D-shaped
Lengths	996 m
Power House	
Type	Surface
Turbines	2 Nos 2500 kW, Horizontal axis Francis
Installed Capacity	5 MW
Generator	Synchronous, brushless type
Net Head	229.3 m

**Table 1-3b:** Parameters confirmed during verification

Parameter	Name	Unit	Value
Installed Capacity	-	MW	5
Net Head	-	metres	229.3
Diversion Tunnel Length	-	metres	996

### 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 <sup>1)</sup>	Qualification Status <sup>2)</sup>	Scheme competence	Technical competence <sup>4)</sup>	Host country Competence	Team Leading competence
<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Mr. Pankaj Patel	TUV India Pvt. Ltd.	TL	A	<input checked="" type="checkbox"/>	S	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Mr. Hemang Shah	TUV India Pvt. Ltd.	TM	E	<input checked="" type="checkbox"/>	S	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Mr. Saroj Sahoo	TUV India Pvt. Ltd.	TM	E	<input checked="" type="checkbox"/>	S	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Klein Ingo	TUV-Nord	TR <sup>3)</sup>	E	<input checked="" type="checkbox"/>	S	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Samir Beqqal	TUV-Nord	TR <sup>3)</sup>	T	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Rainer Winter	TUV-Nord	FA	FA	<input checked="" type="checkbox"/>	S	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

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

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

<sup>3)</sup> No team member

<sup>4)</sup> As per S01-MU03 or S01-VA070 A2 (such as A, B, C.....)

## 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<sup>/MR/</sup> 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	2010-01-15
On-site visit	2010-01-22
Draft reporting finalised	2010-04-19
Technical review on draft reporting finalised	-
Final reporting finalised	2010-05-10
Technical review on final reporting finalised	2010-07-16
Final corrections	-

The main verification steps are described below.

## 2.1 Review of Project Documentation

The VCS PD <sup>/PD/</sup> and supporting background documents related to the 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, Harisons Hydrel Construction Co. Private Limited is producing clean power from hydro power which is a renewable source of energy by setting up a 5 MW ( 2 x 2.5 MW) hydro electric power project and harnessing renewable power from the stream of the natural water flow of the run-of river ROR). The power produced is exported to the NEWNE grid of India through Jari substation. Hydro project is commissioned on 02/04/2008.

During the site visit it is verified that the project activity is implemented as described in the validated VCS-PD. PP has installed two turbines supplied from V A Tech Hydro having sr no AS 20022546 and AS 20022547. Net head of approx 230 meters is available for generation of power. Power generated from the hydro turbines is evacuated through 13 KM long transmission lines from power house to Jari substation. Main meters and check meters are installed at Jari substation from where energy is exported to the grid. Energy meters provided are of trivector electronic meter having accuracy class 0.2S. Hourly reading and monthly recording of the energy is taken and entered into log book.

During the monitoring period the project activity has delivered a total of 45,895 MWh of Energy to the NEWNE grid leading to total baseline emission of 38,554 tCO<sub>2</sub>e. During site visit conducted by the verification team on 22/01/2010 the project implementation was verified and found that the actual project activity was implemented in accordance with the VCS PD <sup>/PD/</sup>.

### 2.2.2 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 : Harisons Hydel Construction Co. (P) Limited (HHCCPL) <sup>/IM01/</sup> Project consultant: Energy Infratech Private Limited <sup>/IM02/</sup>	<ul style="list-style-type: none"> <li>- General aspects of the project</li> <li>- Technical equipment and operation</li> <li>- Changes since validation</li> <li>- Monitoring and measurement equipment</li> <li>- Remaining issues from validation / previous verifications</li> <li>- Calibration procedures</li> <li>- Quality management system</li> <li>- Involved personnel and responsibilities</li> <li>- Training and practice of the operational personnel</li> <li>- Implementation of the monitoring plan</li> <li>- Monitoring data management</li> <li>- Data uncertainty and residual risks</li> <li>- GHG calculation</li> <li>- Procedural aspects of the verification</li> <li>- Maintenance</li> <li>- Environmental aspects</li> <li>- Editorial issues of the Monitoring Report</li> </ul>

A comprehensive list of all interviewed persons is part of section 5 ‘References’.#

### 2.2.3 Collection of Measurements

PP has submitted monitoring report<sup>/MR01/MR02/</sup> describing various details of the project activity, monitored parameters and ER calculations. The reporting<sup>/MR01/MR02/ XLS1/XLS2/</sup> is in line with the requirements of the validated monitoring plan<sup>/VCS PD/</sup> as well as with the applied methodology AMS I .D. version 15<sup>/AMS-ID/</sup>.

The reporting procedures reflect the requirements of the monitoring plan<sup>/ VCS PD/</sup>. As verified by the verification team during the site visit, the net electricity supplied by the project activity to the grid is monitored hourly and recorded once every month and stored appropriately in the log books during the whole monitoring period. Joint meter reading<sup>/JMR/</sup> are taken by the representatives of Himachal Pradesh State Electricity Board (HPSEB) and PP at substation Jari. These data form the basis of emission reduction calculation. Verification team has cross checked the monthly Joint meter readings<sup>/JMR/</sup>, log books<sup>/LOG/</sup>, VCS PD<sup>/VCS-PD/</sup> and confirmed that the net electricity supplied by the project activity to the NEWNE grid is appropriately measured and

recorded by the PP as per the validated monitoring plan and approved methodology AMS I D V 15.

As per the Validated VCS PD<sup>/VCS-PD/</sup>, Net electricity supplied by the project activity to the grid (EGy) is the only parameter which is to be monitored during the whole crediting period.

#### **2.2.4 Observation of established practices and testing of the accuracy of monitoring equipment**

The calibration certificates<sup>/CAL/</sup> of the main meters and check meters at substation end were verified. It found that that the calibration of the meters was done in timely manner as per the requirement of the monitoring plan in the registered PD<sup>/VCS-PD/</sup>. Also the accuracy of the meters was found to be in the range of specified limit in the monitoring plan.

### **2.3 Determination of the reductions in GHG emissions**

For the calculation of baseline emissions the ex-ante determined value of baseline parameter, i.e. Combined Margin Grid Emission Factor of 0.84006 tCO<sub>2</sub>/MWh is taken into account which is a validated value. This Grid emission factor has been derived from the “CO<sub>2</sub> Baseline Database for Indian Power Sector” published by Central Electricity Authority, Ministry of Power, Government of India, version 5.0.

### **2.4 Review of monitoring results and verification of the correct application of monitoring methodologies**

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.

### **2.5 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 PD, 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	-	-	-
3.2	Project implementation	-	-	-
3.3	Completeness of monitoring	5	-	-
3.4	Accuracy of emission reduction calculations	2	-	-
3.5	Quality of evidence to determine emission reductions	-	-	-
3.6	Management and operational system	-	-	-
-	<b>SUM</b>	<b>07</b>	<b>0</b>	<b>0</b>

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

##### Description

During the site visit it is verified that the project activity is implemented as described in the validated VCS-PD. No remaining issue, including the material discrepancy was found from the previous validation.

##### Related Findings

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

##### Final Assessment

As verified from the document review it is confirmed that there is no pending issues from previous validation.

## 3.2 Project implementation

### Description

PP has installed two turbines supplied from V A Tech Hydro having sr no AS 20022546 and AS 200222547. Net head of approx 230 meters is available for generation of power. Power generated from the hydro turbines is evacuated through 13 KM long transmission lines from power house to Jari substation. Main meters and check meters are installed at Jari substation from where energy is exported to the grid. Energy meters provided are of trivector electronic meter having accuracy class 0.2S. Hourly reading and monthly recording of the energy is taken and entered into log book.

### Related Findings

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

### Final Assessment

As verified during site visit project is implemented as specified in the validated PD and exporting the net electricity supplied by the project activity to the regional NEWNE grid.

## 3.3 Completeness of monitoring

### Description

PP has submitted monitoring report<sup>/MR01/MR02/</sup> describing various details of the project activity, monitored parameters and ER calculations. The reporting<sup>/MR01/MR02/ XLS1/XLS2/</sup> is in line with the requirements of the validated monitoring plan/VCS PD/ as well as with the applied methodology AMS I .D. version 15<sup>/AMS-ID/</sup>.

The reporting procedures reflect the requirements of the monitoring plan <sup>/ VCS PD/</sup>. As verified by the verification team during the site visit, the net electricity supplied by the project activity to the grid is monitored hourly and recorded once every month and stored appropriately in the log books during the whole monitoring period. Joint meter reading/JMR/ are taken by the representatives of Himachal Pradesh State Electricity Board (HPSEB) and PP at sub station Jari. These data form the basis of emission reduction calculation. Verification team has cross checked the monthly Joint meter readings <sup>/JMR/</sup>, log books <sup>/LOG/</sup>, VCS PD <sup>VCS-PD/</sup> and confirmed that the net electricity supplied by the project activity to the NEWNE grid is appropriately measured and recorded by the PP as per the validated monitoring plan and approved methodology AMS I D V 15.

As per the Validated VCS PD <sup>VCS-PD/</sup>, Net electricity supplied by the project activity to the grid (EGy) is the only parameter which is to be monitored during the whole crediting period.

The calibration certificates <sup>CAL/</sup> of the main meters and check meters at substation end were verified. It found that that the calibration of the meters was done in timely manner as per the requirement of the monitoring plan in the registered PD/VCS-PD/. Also the accuracy of the meters was found to be in the range of specified limit in the monitoring plan.

The list of the meters with their calibration details are as follows:

Type	Meter Serial no	Location	Date of Calibration	Accuracy class
(Type – ER 300 P)	07034165	Jari Substation on 33 KV	17/12/2007	0.2s
			05/06/2008	0.2s
			02/07/2009	0.2s

Type	Meter Serial no	Location	Date of Calibration	Accuracy class
(Type – ER 300 P)	07034167	Jari Substation on 33KV	17/12/2007	0.2s
			02/02/2009	0.2s
			03/02/2010	0.2s

However CAR 3.3.1 to CAR 3.3.5 had to be raised 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:	3.3-1		
<b>Classification</b>	<input checked="" type="checkbox"/> CAR	<input type="checkbox"/> CL	<input type="checkbox"/> FAR
<b>Description of finding</b> <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	The commissioning details of each hydro units are missing in the monitoring report under the heading “Project generation start date”. The same is to be included in monitoring report.		
<b>Corrective Action #1</b> <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The detail has been incorporated in the revised Monitoring report attached.		
<b>DOE Assessment #1</b> <i>The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	Both turbines are commissioned on 02/04/2008. Same is cross checked by verification team by reviewing commissioning report/CC/. Same is now included in the revised MR. CAR is closed.		
<b>Conclusion</b> <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> To be checked during the first periodic verification <input checked="" type="checkbox"/> Appropriate action was taken <input checked="" type="checkbox"/> Project documentation was corrected correspondingly <input type="checkbox"/> Additional action should be taken <input type="checkbox"/> The project complies with the requirements		

Finding:	3.3-2		
<b>Classification</b>	<input checked="" type="checkbox"/> CAR	<input type="checkbox"/> CL	<input type="checkbox"/> FAR
<b>Description of finding</b> <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	Calibration details for check meters are not included in the monitoring report.		
<b>Corrective Action #1</b> <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The calibration details of the Check meter has been incorporated in the revised Monitoring report attached.		
<b>DOE Assessment #1</b> <i>The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	Calibration details of the check meters are included in the MR. Same is cross checked with calibration certificate/CAL/ submitted by PP. CAR is closed		
<b>Conclusion</b> <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> To be checked during the first periodic verification <input checked="" type="checkbox"/> Appropriate action was taken <input checked="" type="checkbox"/> Project documentation was corrected correspondingly <input type="checkbox"/> Additional action should be taken <input type="checkbox"/> The project complies with the requirements		

Finding:	3.3-3		
<b>Classification</b>	<input checked="" type="checkbox"/> CAR	<input type="checkbox"/> CL	<input type="checkbox"/> FAR
<b>Description of finding</b> <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	Project title described in Header of the monitoring report is not consistent with the details provided in the VCS PD.		
<b>Corrective Action #1</b> <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The project title in the header has been revised in the Monitoring report.		
<b>DOE Assessment #1</b> <i>The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	Project title is now corrected in the header of the revised Monitoring report and is in line with the validated VCS PD. CAR is closed		
<b>Conclusion</b> <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> To be checked during the first periodic verification <input checked="" type="checkbox"/> Appropriate action was taken <input checked="" type="checkbox"/> Project documentation was corrected correspondingly <input type="checkbox"/> Additional action should be taken <input type="checkbox"/> The project complies with the requirements		

Finding:	3.3-4		
<b>Classification</b>	<input checked="" type="checkbox"/> CAR	<input type="checkbox"/> CL	<input type="checkbox"/> FAR
<b>Description of finding</b> <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	Description of the monitored parameter EGy i.e. “Net electricity supplied by the project activity” should be used consistently in the Monitoring report.		
<b>Corrective Action #1</b> <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The Monitoring report has been revised.		
<b>DOE Assessment #1</b> <i>The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	Description of Parameter EGy is now revised in monitoring report as per validated VCS PD. Net electricity supplied by the project activity is a monitored parameter. CAR is closed.		
<b>Conclusion</b> <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> To be checked during the first periodic verification <input checked="" type="checkbox"/> Appropriate action was taken <input checked="" type="checkbox"/> Project documentation was corrected correspondingly <input type="checkbox"/> Additional action should be taken <input type="checkbox"/> The project complies with the requirements		

Finding:	3.3-5		
<b>Classification</b>	<input checked="" type="checkbox"/> CAR	<input type="checkbox"/> CL	<input type="checkbox"/> FAR
<b>Description of finding</b> <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	Date format dd/mm/yyyy should be used in the MR.		
<b>Corrective Action #1</b> <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The Monitoring report has been revised.		
<b>DOE Assessment #1</b> <i>The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	Date format dd/mm/yyyy is now used in the revised Monitoring report. CAR is closed		
<b>Conclusion</b> <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> To be checked during the first periodic verification <input checked="" type="checkbox"/> Appropriate action was taken <input checked="" type="checkbox"/> Project documentation was corrected correspondingly <input type="checkbox"/> Additional action should be taken <input type="checkbox"/> The project complies with the requirements		

## Final Assessment

During site visit it was verified that the meters for monitoring the net electricity supplied by the project activity to the grid are installed as per the monitoring plan and the monitoring procedure followed is same as it is described both in the VCS PD<sup>VCS-PD/</sup> and the monitoring report<sup>MR01/MR02/</sup>.

### **3.4 Accuracy of emission reduction calculations**

#### Description

For the calculation of baseline emissions the ex-ante determined value of baseline parameter, i.e. Combined Margin Grid Emission Factor of 0.84006 tCO<sub>2</sub>/MWh is taken into account which is a validated value. This Grid emission factor has been derived from the “CO<sub>2</sub> Baseline Database for Indian Power Sector” published by Central Electricity Authority, Ministry of Power, Government of India, version 5.0.

#### **Baseline Emissions:**

The formula used for the determination of baseline emissions is consistent with the PD and approved methodology AMS I D V 15:

$$BE_y = E_{GBL, y} \times EF_{CO_2}$$

Where:

BE<sub>y</sub> = Baseline Emissions in year y; t CO<sub>2</sub>

E<sub>GBL, y</sub> = Energy baseline in year y; kWh

EF<sub>CO<sub>2</sub></sub> = CO<sub>2</sub> Emission Factor in year y; t CO<sub>2</sub>e/kWh

$$\begin{aligned} BE_y &= 45,895 \text{ MWh} \times 0.84006 \text{ tCO}_2/\text{MWh} \\ &= 38,554 \text{ tCO}_2\text{e} \end{aligned}$$

The baseline emissions (BE<sub>y</sub>) during the monitoring period are 38,554 tCO<sub>2</sub>e

Monitoring period considered is from 02/04/2008 to 31/03/2010. Verification team has verified the Joint monthly readings/JMR/ for all the months starting from April 2008 to end month of March 2010 and confirmed that the energy meter readings considered for emission reduction are correct and matching with the joint monthly readings. As verified from the Joint Monthly Readings /JMR/ Net electricity supplied by the project activity to the grid E<sub>Gy</sub> for the month of June 2008 and July 2009 are based on the

meter readings from check meters installed at substation Jari as during these months main meters are sent for calibration.

Additionally, verification team has cross checked actual power exported from the project is 45.90 MUs based on the generation data submitted and verified by verification team for entire monitoring period. The values are more than the estimated value of 42.54 MUs (21.27 Mus / annum) based on Detailed Project Report and used in the validated VCS PD<sup>VCS-PD/</sup> for estimation of Emission reduction calculation. Reasons for higher PLF are due to higher rain during the year 2008. Actual power exported to the grid during the monitoring period is within the sensitivity limit of 10 % considered for robustness of assumption in the validated VCS PD/VCS-PD/. Further DOE is convinced that the higher PLF is due to excess rainfall during the year 2008 as reported by Indian Meteorological department.

#### Project Emission & Leakage:

In accordance with AMS I.D. (Version 15), the project emission and leakage were considered as zero.

#### Emission Reduction:

$$ER_y = BE_y - PE_y - LE_y$$

$$= BE_y - 0 - 0$$

$$= BE_y$$

Emission Reduction = baseline emission

Hence, total emission reductions due to project activity during crediting period are 38,554 t CO<sub>2</sub>e.

All the figures as per the monitoring plan were cross-checked by the verification team against basic monitored data and the calculations were found correct.

However following CAR 3.4-1 to 3.4-2 were raised and closed successfully:

Related Findings

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

Finding:	3.4-1		
<b>Classification</b>	<input checked="" type="checkbox"/> CAR	<input type="checkbox"/> CL	<input type="checkbox"/> FAR
<b>Description of finding</b> <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	Comparison of the actual emission reduction claimed in the monitoring period with the estimate in the registered PD, and explanation on any significant increase should be included in MR.		
<b>Corrective Action #1</b> <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	Comparison of the actual emission reduction with estimated emission reduction and justification is provided in revised monitoring report.		
<b>DOE Assessment #1</b> <i>The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	Comparison of the actual emission reduction with respect to estimated emission reduction is now included in the revised monitoring report with justification. Same is cross checked by verification team and convinced that higher emission reduction is due to excess rainfall during the year 2008. However same is within the sensitivity limit of 10 %. CAR is closed.		
<b>Conclusion</b> <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> To be checked during the first periodic verification <input checked="" type="checkbox"/> Appropriate action was taken <input type="checkbox"/> Project documentation was corrected correspondingly <input type="checkbox"/> Additional action should be taken <input checked="" type="checkbox"/> The project complies with the requirements		

Finding:	3.4-1		
<b>Classification</b>	<input checked="" type="checkbox"/> CAR	<input type="checkbox"/> CL	<input type="checkbox"/> FAR
<b>Description of finding</b> <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	In Emission reduction calculation sheet only monthly generation details are given. Month wise emission reduction calculations for baseline emission, project emission and leakage emission are not included.		
<b>Corrective Action #1</b> <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The emission reduction calculation spreadsheet has been revised.		

<p><b>DOE Assessment #1</b>  <i>The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i></p>	<p>Monthly emission reduction calculation is now included in the revised emission reduction calculation sheet.                  CAR is closed.</p>
<p><b>Conclusion</b>  <i>Tick the appropriate checkbox</i></p>	<p><input type="checkbox"/> To be checked during the first periodic verification  <input checked="" type="checkbox"/> Appropriate action was taken  <input type="checkbox"/> Project documentation was corrected correspondingly  <input type="checkbox"/> Additional action should be taken  <input checked="" type="checkbox"/> The project complies with the requirements</p>

### Final Assessment

Emission reduction calculation is cross checked by the verification team with the joint meter readings. Grid emission factor considered for emission reduction is fixed ex-ante and is taken from the validated VCS-PD and is based on CEA CO2 database. All the data captured i.e. log books are checked for net electricity supplied by the project activity. Emission reduction are calculated correctly by the PP for the monitoring period..

## 3.5 Quality of evidence to determine emission reduction

### Description

The only key monitoring parameter with influence on the calculation of the emission reductions is the net electricity supplied by the project activity (EGy) to the grid and the grid emission factor. The power is measured with high accuracy and duly calibrated class 0.2S power meters. Verification team has cross checked the calibration certificate<sup>/CAL/</sup>, Daily log books<sup>/LOG/</sup> and installed meters at Jari substation during site visit.

The grid emission factor is taken from validated VCS PD and in turn referenced from “CO2 Baseline Database for Indian Power Sector” published by Central Electricity Authority, Ministry of Power, Government of India, version 5.0.

The net electricity supplied by the project activity to the grid as reported in the monitoring report<sup>/MR01/MR02/</sup> and the emission reduction calculation sheet<sup>/XLS1/XLS2/</sup> were measured by the energy meters installed at Jari substation of HPSEB and is verified with the Joint Monthly Readings/JMR/ and commercial invoices<sup>/INV/</sup> raised by the PP. These Joint Monthly readings/JMR/ are taken by the representatives of the

Himachal Pradesh State Electricity Board (HPSEB) in presence of PP. These are considered as highly authentic and reliable source of information. All evidences are clearly identifiable and assessed to be correct.

All records including daily generation, needed for monitoring are archived<sup>/LOG/</sup> and were found to be in line with the requirements of the monitoring plan. The monitored data have been provisioned to be kept for at least 2 years after the end the issuance of VERs as per the requirement.

#### Related Findings

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

#### Final Assessment

All necessary monitoring instruments are installed. The measuring devices use a proven and state of the art technology for measurement. The details of the meters are given in the monitoring report<sup>MR01/MR02/</sup>. Calibration has been carried out as defined in the monitoring plan and the records for the same were reviewed. Based on the same it is concluded that the recorded reading from these meters are accurate enough.

### 3.6 Management and operational system

#### Description

The roles and responsibilities of the responsible person for monitoring of emission reductions for the verification of measurement, data collection as well as the preparation of monitoring report have been implemented as it is defined in the validated VCS PD<sup>VCS-PD/</sup>. This was verified during the on site assessment conducted by the verification team.

All monitored data are archived partly in physical and partly in electronic form. The data will be kept for the whole crediting period and additional 2 years as given in the VCS PD<sup>VCS-PD/</sup>.

The net resultant value of the VERs has been remained as 38,554 after closure of the CARs/CLs.

#### Related Findings

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

#### Final Assessment

During the site visit verification team has reviewed the data capturing, operation and maintenance procedures followed. Also based on the interview with the operation and maintenance team it is ensured that there is a dedicated team for looking after operation and maintenance of the power house. Hourly Readings of the Net energy exported to the grid is taken at Jari substation by the shift operator and entered in to log book. Same is verified during the site visit. Joint Meter readings are taken every month by the representatives of HPSEB and PP

## 4 VERIFICATION STATEMENT

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 VCS PD<sup>/VCS-PD/</sup>, VCS validation report<sup>/VAL-R/</sup> Policy Announcement from VCS association on 19th March, 2008 and VCS 2007.1, monitoring report<sup>/MR01/MR02/</sup>. and supporting documents made available to the verifiers by the 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 VCS PD<sup>/VCS-PD/</sup>.
- The monitoring system is in place and functional.
- The installed equipment essential for generating emission reductions runs reliably.
- The GHG emission reductions are calculated without material misstatements in a conservative and appropriate manner.

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: 02/04/2008 to 31/03/2010 including both days.

Verified emission reduction generated in the above mentioned monitoring period:

Baseline emissions (t CO <sub>2</sub> eqv.)	Project emissions (t CO <sub>2</sub> eqv.)	Leakage emissions (t CO <sub>2</sub> eqv.)	Net Emission reductions (t CO <sub>2</sub> eqv.)
<b>38,554</b>	0	0	<b>38,554</b>

*Pankaj Patel*

*Rainer Winter*

Vadodara 2010-05-10  
 Pankaj Patel  
 Verification Team Leader  
 Vadodara, 2010-05-10

Essen, 2010-08-24  
 Rainer Winter  
 Final approval  
 Essen, 2010-08-24

## 5 REFERENCES

**Table 5-1:** Documents provided by the project participant

Reference	Document
/CC/	Commissioning certificate for both turbines dated 03/04/2008
/CAL/	Calibration Certificate of electricity meters covering the 1 <sup>st</sup> monitoring period. Main meters dated 17/12/2007, 05/06/2008 and 02/07/2009 and check meters dated 17/12/2007, 02/02/2009 and 03/02/2010.
/INV/	Monthly Invoices raised by the PP to HPSEB for sale of electricity for the period April 2008 to March 2010.
/JMR/	Joint monthly reading taken by representatives of HPSEB and PP for the period April 2008 to March 2010
/LOG/	Daily Log Book for the period 02/04/2008 to 31/03/2010
/MR01/	First Monitoring Report version 1 dated 03/04/2010
/MR02/	Final Monitoring Report version 2 dated 30/04/2010
/VCS-PD/	Validated VCS PD dated 30/03/2010
/VAL-R/	VCS Validation Report no 8106144531-10/65 dated 30/03/2010
/XLS1/	Excel calculation sheets provided by the project participant (related to MR01).
/XLS2/	Excel calculation sheets provided by the project participant (related to MR02).

**Table 5-2:** Background investigation and assessment documents

Reference	Document
/AMS-I.D./	Grid connected renewable electricity generation (Version 15: 30/10/2009)
/CPM/	TÜV NORD JI / CDM CP Manual (incl. CP procedures and forms)
/VCS/	Voluntary Carbon Standard 2007.1
/TE/	Tool to calculate emission factor for an electricity system.
/CEA/	CO2 Baseline Database for Indian Power Sector –User Guide, Ver 05 published by CEA.
/VVM/	Validation and Verification Manual (Version 1.1, Annex 3; EB 51)
/AMS-I.D./	Grid connected renewable electricity generation (Version 15: 30/10/2009)
/CPM/	TÜV NORD JI / CDM CP Manual (incl. CP procedures and forms)
/VVM/	Validation and Verification Manual (Version as per EB 51)

**Table 5-3:** Websites used

Reference	Link	Organisation
/cea/	<a href="http://www.cea.nic.in">www.cea.nic.in</a>	Central Electricity Authority, Ministry of Power, Government of India
/imp/	<a href="http://www.powermin.nic.in">www.powermin.nic.in</a>	Indian Ministry of Power
/unfccc/	<a href="http://cdm.unfccc.int">http://cdm.unfccc.int</a>	UNFCCC

Reference	Link	Organisation
/VCS/	www.v-c-s.org	VCS website

**Table 5-4:** List of interviewed persons

<sup>1)</sup> Means of Interview: (Telephone, E-Mail, Visit)

Reference	Mol1		Name	Organisation / Function
/IM01/	V	<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms	Ghanshyam Sood, Director	Harisons Hydel construction Co.(P) Limited (HHCCPL)
/IM01/	V	<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms	Suresh Kumar, Manager	Harisons Hydel construction Co.(P) Limited (HHCCPL)
/IM01/	V	<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms	K.C.Malhotra. Plant manager	Harisons Hydel construction Co.(P) Limited (HHCCPL)
/IM01/	V	<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms	Ajay Sharma, Shift Incharge	Harisons Hydel construction Co.(P) Limited (HHCCPL)
/IM01/	V	<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms	Man Singh, Electrician	Harisons Hydel construction Co.(P) Limited (HHCCPL)
/IM01/	V	<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms	Surjeet Chauhan, Fitter	Harisons Hydel construction Co.(P) Limited (HHCCPL)
/IM01/	V	<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms	Fatehchand Thakur Junior Engineer	Junior Engineer, 33 KV Jari Sub station
/IM02/	V	<input checked="" type="checkbox"/>	Samrat Sengupta	Consultants, Energy



TÜV NORD JI/CDM Certification Program

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		Mr. <input type="checkbox"/> Ms.		Infratech Private Limited
/IM02/	T	<input type="checkbox"/> Mr. <input checked="" type="checkbox"/> Ms.	Mallika Basu	Consultants, Energy Infratech Private Limited
/IM02/	V	<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Subrata Chakrabarty	Consultants, Energy Infratech Private Limited