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# VERIFICATION / CERTIFICATION REPORT

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## “5 MW DEBAL GRID- CONNECTED HYDROELECTRIC PROJECT IN UTTARANCHAL, INDIA”

(UNFCCC Registration Ref. No. 2965)

Monitoring Period:  
15 March 2010 to 31 March 2011

REPORT NO. 2012-9201

REVISION NO. 02

DET NORSKE VERITAS



## VERIFICATION / CERTIFICATION REPORT

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Client:	Client ref.:
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<b>Summary:</b>			
<p>DNV Climate Change Services AS (DNV) has performed the verification of the emission reductions reported for the “5 MW Debal Grid-connected Hydroelectric Project in Uttaranchal, India” (UNFCCC Registration Ref. No. 2965) for the period 15 March 2010 to 31 March 2011.</p> <p>In our opinion, the GHG emission reductions reported for the project in the revised monitoring report (version 02) of 23 April 2012 are fairly stated.</p> <p>The GHG emission reductions were calculated correctly on the basis of the approved monitoring methodology AMS-I.D (version 13) and the monitoring plan contained in the revised Project Design Document approved by UNFCCC on 17 February 2012.</p> <p>DNV Climate Change Services AS is able to certify that the emission reductions from the “5 MW Debal Grid-connected Hydroelectric Project in Uttaranchal, India” during the period 15 March 2010 to 31 March 2011 amount to 15 359 tonnes of CO<sub>2</sub> equivalent.</p>			
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***Abbreviations***

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CDM EB	Clean Development Mechanism- Executive Board
CEA	Central Electricity Authority
CER	Certified Emission Reduction(s)
CHPPL	Chamoli Hydro Power Private Limited
CL	Clarification request
CM	Combined Margin
CMP	CDM Modalities and Procedures
CO <sub>2</sub>	Carbon dioxide
CO <sub>2</sub> e	Carbon dioxide equivalent
DNV	DNV Climate Change Services AS
DNA	Designated National Authority
EF	Emission Factor
FAR	Forward Action Request
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IOCL	Indian Oil Corporation Limited
IPCC	Intergovernmental Panel on Climate Change
JMR	Joint Meter Reading
MP	Monitoring Plan
MR	Monitoring Report
NCV	Net Calorific Value
NEWNE	Northern, Eastern, Western and North-Eastern
PDD	Project Design Document
RPM	Revolutions Per Minutes
UNFCCC	United Nations Framework Convention on Climate Change
UPCL	Uttarakhand Power Corporation Limited
VVM	Validation and Verification Manual



## 1 INTRODUCTION

Chamoli Hydro Power Pvt. Ltd has commissioned DNV Climate Change Services AS (DNV) to carry out the verification and certification of emission reductions reported for the “5 MW Debal Grid-connected Hydroelectric Project in Uttaranchal, India” (the project) in the period 15 March 2010 to 31 March 2011. This report contains the findings from the verification and a certification statement for the certified emission reductions.

### 1.1 Objective

Verification is the periodic independent review and *ex post* determination by a Designated Operational Entity (DOE) of the monitored reductions in GHG emissions that have occurred as a result of the registered CDM project activity during a defined monitoring period.

Certification is the written assurance by a DOE that, during a specific period in time, a project activity achieved the emission reductions as verified.

The objective of this verification was to verify and certify emission reductions reported for the “5 MW Debal Grid-connected Hydroelectric Project in Uttaranchal, India” for the period 15 March 2010 to 31 March 2011.

### 1.2 Scope

The scope of the verification is:

- To verify that actual monitoring systems and procedures are in compliance with the monitoring systems and procedures described in the monitoring plan.
- To evaluate the GHG emission reduction data and express a conclusion with a reasonable level of assurance about whether the reported GHG emission reduction data is free from material misstatement.
- To verify that reported GHG emission data is sufficiently supported by evidence.

The verification shall ensure that reported emission reductions are complete and accurate in order to be certified.

### 1.3 Description of the project activity

Project Parties:	India (Host Party)
Title of project activity:	5 MW Debal Grid-connected Hydroelectric Project in Uttaranchal, India
UNFCCC registration No:	2965
UNFCCC registration date:	15 March 2010
Baseline and monitoring methodology	AMS-I.D (version 13)
Project Participant:	Chamoli Hydro Power Pvt. Ltd from Host Party India
Location of the project activity:	The project activity is located in the village Debal of Narain Bagar taluk of Chamoli district in the state of



Uttarakhand that forms part of the integrated northern, eastern, western and north-eastern (NEWNE) regional grid of India. The geographical coordinates of the project location is 30° 3' N latitude and 79° 33' 10" E longitude.

Project's crediting period: 15 March 2010 to 14 March 2020 (fixed crediting period)

Period verified in this verification: 15 March 2010 to 31 March 2011

## 1.4 Methodology for determining emission reductions

According to the applied methodology AMS-I.D, version 13 /29/ and revised Project Design Document approved by UNFCCC on 17 February 2012 /5/, the emission reductions for the project are determined as the difference between the baseline emissions, project emissions and leakage:

$$ER_y = BE_y - PE_y - L_y$$

**Baseline emissions:** The project's baseline emissions are determined as the product of the net electricity supplied to the integrated NEWNE regional grid of India by the project activity and the combined margin emission factor of the integrated NEWNE regional grid of India.

$$BE_y = EG_y \times EF_y$$

Where,

$EG_y$  is the net electricity supplied to the integrated NEWNE regional grid of India by the project activity. The net electricity supplied to the integrated NEWNE regional grid of India is calculated as a difference of electricity exported to the integrated NEWNE regional grid of India by the project activity ( $EG_{\text{export}, y}$ ) and electricity imported from the integrated NEWNE regional grid of India by the project activity ( $EG_{\text{import}, y}$ ). The electricity exported/imported to/from grid is monitored continuously and recorded jointly by the representatives of UPCL and Chamoli Hydro Power Pvt. Ltd on monthly basis in the form of joint meter reading certificates /8/.

$EF_y$  is the combined margin emission factor of the integrated NEWNE regional grid of India to which the project is connected and was determined and validated *ex-ante* as 810.46 tCO<sub>2</sub>/GWh and will not be updated during the entire fixed crediting period /5/.

**Project Emissions:** The project activity is equipped with 63 kVA diesel generator to meet emergency power requirement of the power plant. Hence, emission due to diesel consumption in diesel generator has been considered as project emissions /2/. The project emissions are calculated as:

$$PE_{\text{diesel } i} = F_{i,y} \times \text{Density}_i \times NCV_{\text{diesel}} \times EF_{CO2\ i} \times \text{OXID} / 10^6 \text{ (in tCO}_2\text{e)}.$$

Where,

$F_{i,y}$  = Quantity of diesel consumed in diesel generator during the verification period, measured via level gauge installed at diesel generator tank and recorded in diesel generator log book on daily basis and aggregated on monthly basis /15/.

$\text{Density}_i$  = Density of diesel, fixed *ex-ante* based on the fuel characteristics published by the IOCL (one of the major manufacturer and supplier of diesel in India) and the value applied is 0.845 Kg/Liter /13/.

$NCV_{\text{diesel}}$  = Net calorific value of diesel, fixed *ex-ante* based on the IPCC 2006 upper bound value at 95% confidence interval and the value applied is 43.3 TJ/Gg /14/.



$EF_{CO_2 i}$  = Emission factor of diesel, fixed *ex-ante* based on the IPCC 2006 upper bound value at 95% confidence interval and the value applied is 74.8 tCO<sub>2</sub>/TJ /14/.

OXID = oxidation factor of diesel, as per IPCC 2006 Tier 1 sectoral approach, the oxidation factor of diesel is already taken into account while calculating the emission factor for diesel. Hence no separate value for oxidation factor of diesel is required to be used for project emission calculation/14/.

**Leakage:** as the project activity is new grid connected project and involves installation of new equipments leakage is considered to be zero as also stated in the revised Project Design Document approved by UNFCCC on 17 February 2012 /5/.

Therefore, the emission reductions are accounted as:

Emission Reduction (ER) = Baseline emission – Project emissions.

$ER_y = BE_y - PE_y$

## 2 METHODOLOGY

The verification of the emission reductions has assessed all factors and issues that constitute the basis for emission reductions from the project. These include:

- Review of project documentation; including the registered PDD /3/, validation report /4/, applied version of methodology (AMS-I.D, version 13) /29/, monitoring reports (webhosted version 01 dated 08 July 2011 /1/ and final version 02 dated 23 April 2012 /1/), emission reduction spreadsheets (initial version 01 and final version 02) /2/, revised project design document approved by UNFCCC on 17 February 2012 /5/, validation opinion on combined notification/request for approval of changes from the project activity as described in the registered project design document and request for revision of monitoring plan approved by UNFCCC on 17 February 2012 /6/.
- The actual installed capacity of the project activity is 5 MW; consisting of two Synchronous generators with a rated capacity of 2.5 MW each coupled to two horizontal Francis turbines with capacity 2.5 MW each /10/ and is in conformance with the descriptions provided in the revised project design document approved by UNFCCC on 17 February 2012 /5/.
- Monitoring of parameters are in conformance with the descriptions provided in the revised project design document approved by UNFCCC on 17 February 2012 /5/ and verification of all factors and issues that constitute the basis for emission reductions are in conformance with the descriptions provided in the revised project design document approved by UNFCCC on 17 February 2012 /5/. The revised project design document approved by UNFCCC on 17 February 2012 requires following parameters to be monitored :
  - a) Combined margin emission factor of integrated NEWNE regional grid of India ( $EF_y$ ): Determined and validated *ex-ante* as 810.46 tCO<sub>2</sub>/GWh and will not be updated during the entire fixed crediting period /5/.
  - b) Density of diesel (density  $\rho$ ): Fixed *ex-ante* based on the fuel characteristics published by the Indian Oil Corporation Limited (one of the major manufacturer and supplier of diesel in India) and the value applied is 0.845 Kg/Liter /13/.



- c) Net calorific value of diesel ( $NCV_{\text{diesel}}$ ): Fixed *ex-ante* based on the IPCC 2006 upper bound value at 95% confidence interval and the value applied is 43.3 TJ/Gg /14/.
- d) Emission factor of diesel ( $EF_{CO_2 i}$ ): Fixed *ex-ante* based on the IPCC 2006 upper bound value at 95% confidence interval and the value applied is 74.8 tCO<sub>2</sub>/TJ /14/.
- e) Oxidation factor of diesel (OXID): As per IPCC 2006 Tier 1 sectoral approach, the oxidation factor of diesel is already taken into account while calculating the emission factor for diesel. Hence no separate value for oxidation factor of diesel is required to be used for project emission calculation /14/.
- f) Total electricity generated by the project activity ( $EG_{\text{gross } y}$ ): The total electricity generated by the project activity is measured continuously via calibrated energy meters of 1.0 accuracy class and recorded on daily basis in plant log books and aggregated on monthly basis /16/.
- g) Auxiliary electricity consumption of the project activity ( $EG_{\text{auxiliary } y}$ ): The auxiliary electricity consumption of the project activity is measured continuously via calibrated energy meter of 1.0 accuracy class and recorded on daily basis in plant log books and aggregated on monthly basis /17/.
- h) Electricity supplied to the grid by the project activity ( $EG_{\text{export } y}$ ): The electricity supplied to the grid by the project activity is measured continuously via one set of calibrated main and check meters of 0.2s accuracy class installed at grid interconnection point and recorded on monthly basis in the form of joint meter reading certificates issued by Uttarakhand Power Corporation Limited (UPCL) and aggregated on annual basis /8/.
- i) Electricity imported to the project activity from grid ( $EG_{\text{import } y}$ ): The electricity imported by the project activity from grid is measured continuously via one set of calibrated main and check meters of 0.2s accuracy class installed at grid interconnection point and recorded on monthly basis in the form of joint meter reading certificates issued by Uttarakhand Power Corporation Limited (UPCL) and aggregated on annual basis /8/.
- j) Quantity of fossil fuel type i (diesel) combusted in the project plant ( $F_{i y}$ ): The quantity of diesel combusted in the diesel generator is measured using level gauge installed at diesel generator tank and recorded on daily basis in plant log books and aggregated on monthly basis /15/.

The verification process has been performed based on the recommendations in the Validation and Verification Manual (version 1.2) /28/.



**Verification team**

<b>Role</b>	<b>Last Name</b>	<b>First Name</b>	<b>Country</b>	<b>Type of involvement</b>					
				Desk review	Site visit	Reporting	Supervision of work	Technical review	TA 1.2 competence
Team leader (Verifier)	Srivastava	Gaurav	India	✓	✓	✓	✓		✓
Verifier	Kumaraswamy	Chandrashekara	India	✓		✓	✓		
Assessor under training	Kulkarni	Anand.S	India	✓	✓	✓			✓
Technical reviewer	SM Jamaluddin	Wan Hasliza	Malaysia					✓	✓

**Duration of verification**

Monitoring report publication: 20 July 2011  
 Preparations: 22 July 2011 to 29 July 2011  
 On-site verification: 11 August 2011  
 Reporting, calculation checks and QA/QC: From 18 August 2011 to 23 May 2012

**2.1 Review of documentation**

The basis for the verification has been the monitoring report for the period 15 March 2010 to 31 March 2011 (webhosted version 01 dated 08 July 2011 and final version 02 dated 23 April 2012) /1/. In addition to the monitoring report, the emission reduction calculation provided in the form of spreadsheets (version 01 dated 08 July 2011 and final version 02 dated 23 April 2012) /2/ submitted by Chamoli Hydro Power Pvt. Ltd, were assessed as a part of the verification.

In addition, the project's registered Project Design Document version 04 dated 16 January 2010 /3/, the revised project design document approved by UNFCCC on 17 February 2012 /5/, the project's validation report version 04 dated 02 February 2010 /4/ and validation opinion on combined notification/request for approval of changes from the project activity as described in the registered project design document and request for revision of monitoring plan approved by UNFCCC on 17 February 2012 /6/ were also assessed.

During the desk review, DNV has applied standard auditing techniques to assess the quality of information provided. The following activities were performed:

- A review of the data and information presented to verify their completeness;
- A review of the monitoring plan and monitoring methodology, paying particular attention to the frequency of measurements, the quality of metering equipment including calibration requirements, and the quality assurance and quality control procedures; and



- An evaluation of data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions.

The data presented in the monitoring report were assessed in detail by a thorough review of the detailed project documentation and electricity generation records /8/ & /16/, diesel consumption records /15/, diesel purchase invoices /18/, interviews with personnel at Chamoli Hydro Power Pvt. Ltd /39/-/46/, collection of measurements, observation of established monitoring and reporting practices and assessment of the reliability of monitoring equipments. This has enabled the verification team to assess the accuracy and completeness of reported monitoring results and verify the correct application of the approved monitoring methodology AMS-I.D version 13 /29/. Data from other sources include the combined margin emission factor of integrated NEWNE regional grid of India /19/, density of diesel /13/, net calorific value of diesel and emission factor of diesel /14/. DNV confirms that all these parameters are fixed *ex-ante* the value applied are consistent with revised project design document approved by UNFCCC on 17 February 2012 /5/.

## 2.2 Site visit

Detailed verification of all data contained in the monitoring report was performed during the site visit by DNV at the hydroelectric plant of Chamoli Hydro Power Pvt. Ltd on 11 August 2011. The key personnel of the project were interviewed or assisted the verification team /39/-/46/.

Interviewed organisation	Interview topics
Chamoli Hydro Power Pvt. Ltd	<ul style="list-style-type: none"> <li>➤ Whether the project has been implemented as planned</li> <li>➤ Calculation of emission reductions</li> <li>➤ Adherence to monitoring plan as established in the registered PDD.</li> <li>➤ Management procedures like internal audits and reviews to minimise uncertainties in data monitoring and data management.</li> <li>➤ Calibration records</li> <li>➤ Project performance</li> <li>➤ Resources, training needs and procedures for operation and maintenance.</li> </ul>

During the on-site assessment, DNV has applied standard auditing techniques to assess the quality of information provided. The following aspects of the CDM project activity have been verified:

- The implementation and operation of the CDM project activity as described in revised PDD approved by UNFCCC on 17 February 2012 /5/;
- The information flow for generating, aggregating and reporting of the monitoring parameters as described in revised PDD approved by UNFCCC on 17 February 2012 /5/; and



- The operational and data collection procedures are implemented in accordance with the monitoring plan in the revised PDD approved by UNFCCC on 17 February 2012 /5/.

Further, the following activities were performed:

- A cross-check between information provided in the monitoring report and data from other sources; e.g. monthly electricity sales invoices and payment received against electricity sold /7/;
- A check of the monitoring equipment including calibration performance /20/-/23/ and observations of monitoring practices against the requirements of the revised PDD approved by UNFCCC on 17 February 2012 /5/ and the selected methodology;
- A review of calculations and assumptions made in determining the GHG data and emission reductions /2/; and
- An identification that quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters /26/.

The data presented in the monitoring report was assessed by review of the detailed project documentation and electricity generation records /8/& /16/, diesel consumption records /15/, diesel purchase invoices /18/, as well as by interviews with personnel at Chamoli Hydro Power Pvt. Ltd /39/-/46/ and observation of collection of measurements, observation of established monitoring and reporting practices and assessment of the reliability of monitoring equipment. This has enabled the verification team to assess the accuracy and completeness of reported monitoring results; to verify the application of the approved monitoring methodology and the determination of the emission reductions.

In addition, all parameters required by the monitoring methodology AMS-I.D, version 13 /20/, and the management system were assessed during the site visit.

## 2.3 Reporting of findings

A corrective action request (CAR) is issued, where:

- i. Non-conformities with the monitoring plan or methodology are found in monitoring and reporting, or if the evidence provided to prove conformity is insufficient;
- ii. Mistakes have been made in applying assumptions, data or calculations of emission reductions which will impair the estimate of emission reductions;
- iii. Issues identified in a FAR during validation to be verified during verification have not been resolved by the project participants.

A clarification request (CL) shall be raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

A forward action request (FAR) is issued for actions if the monitoring and reporting require attention and/or adjustment for the next monitoring period.

During this verification, 5 CARs and 2 CLs have been identified. The CARs and CLs were satisfactorily addressed by Chamoli Hydro Power Pvt. Ltd by seeking an approval from UNFCCC for notification/request for approval of changes from the project activity as described in the registered project design document and request for revision of monitoring plan and subsequently by revising the monitoring report and emission reduction spreadsheet.



No forward action requests were identified during the current verification period (refer to Appendix A of this report).

### 3 VERIFICATION FINDINGS

This section summarises the findings from the verification of the emission reductions reported for the “5 MW Debal Grid-connected Hydroelectric Project in Uttarakhand, India” for the period 15 March 2010 to 31 March 2011.

#### 3.1 Remaining issues, FARs from previous validation / verification

This is the first verification of the project activity after its registration with the UNFCCC on 15 March 2010. According to the validation report /4/, no CAR, CLs or FAR were required to be closed out during verification.

#### 3.2 Project implementation

During the site visit conducted on 11 August 2011, it was found by the verification team that some features of the project activity, monitoring equipments installed at project site and the monitoring practice practised at project site is not in compliance with the registered PDD /3/ (refer CAR 1 and CAR 2 provided in Appendix A of this report). Hence, DNV raised a corrective action request and requested project proponent to submit a notification of changes from the project activity as described in the registered project design document and request for revision of monitoring plan to UNFCCC. On 31 January 2012 an updated PDD along with the validation opinion on notification of changes from the project activity as described in the registered project design document and request for revision of monitoring plan was submitted to UNFCCC, which was approved on 17 February 2012 /5/ & /6/.

DNV confirms that the project implementation is in accordance with the project description contained in project design document approved on 17 February 2012 /5/ and the validation opinion on the changes in the registered PDD issued on 31 January 2012 by DNV and approved by CDM EB on 17 February 2012 /6/. The verification team confirmed through visual inspection and document review that all physical features of the proposed CDM project activity including data collection systems and storage systems have been implemented in accordance with the revised project design document approved on 17 February 2012 /5/.

The project activity harnesses the hydro potential available at project site to generate electricity and supply it to the integrated NEWNE regional grid of India. The project activity has an aggregated installed capacity of 5 MW consisting of two synchronous generators with a rated capacity of 2.5 MW each coupled to two horizontal Francis turbines with capacity 2.5 MW each /10/. The project activity was synchronized to integrated NEWNE grid on 21 July 2007 /9/ and commercial operation of exporting power started on 21 July 2007 /12/ prior to its CDM registration on 15 March 2010; thus, only the emission reductions occurred from 15 March 2010 have been claimed. The selected monitoring period 15 March 2010 to 31 March 2011 is within the fixed crediting period of 15 March 2010 to 14 March 2020.

The project activity sells power to UPCL, which has signed a power purchase agreement (PPA) with the plant /11/. The project boundaries and all key equipments are in line with the revised project design document approved on 17 February 2012 /5/. DNV confirmed during the site visit that the CDM project is completely operational. DNV has verified the nameplate capacity of each turbine and generator installed at the plant site. The key details of the plant



equipment are provided below:

Equipment Specifications:	
<u>Turbines:</u>	<u>Generators:</u>
Quantity: 2 Nos.	Quantity: 2 Nos.
Make: Boving Fouress Ltd.	Make: WEG
Type: Horizontal Francis	Model: SSA710
Rated discharge: 14 m <sup>3</sup> /sec	Sl. No: 156668 and 156669
Rated Power: 2.5 MW	Capacity : 3.125 MVA
Speed: 600 RPM	Power factor : 0.8
	Voltage : 6600 V
	Rated speed : 600 RPM
	Frequency : 50 Hz
<u>Power Transformer</u>	<u>Auxiliary Transformer</u>
Sl. No.: ST-34683	Sl. No. : ST-34701
Type: ONTR 6500/33	Capacity : 160 kVA
Capacity: 6500 kVA	Frequency : 50 Hz
Frequency: 50 Hz	Step down : 33000/415 V
Step up: 6.6/33 KV	
<u>Diesel Generator</u>	
Make: Kirloskar	
Capacity: 63 kVA	
Frequency: 50	
Volts: 415	
Power Factor: 0.8	
Tank Capacity: 145 Litres	

### 3.3 Information (data and variables) provided in the monitoring report that is different from that stated in the registered PDD

During the current verification period (15 March 2010 to 31 March 2011) the project activity has supplied 18.98 GWh of net electricity (before applying the correction factor due to delay in calibrations) to the integrated NEWNE regional grid of India in comparison to 30.83 GWh of net electricity estimated in the revised PDD approved on 17 February 2012 /5/ (for 382 days), the variation is deemed to be within a reasonable range considering outages of 5289 hours and 35 minutes for Unit-I and 2769 hours and 20 minutes for Unit-II /24/. It has been confirmed by DNV that the maximum output capacity has not been exceeded on any given month during the monitoring period (15 March 2010 to 31 March 2011).

The variation in net electricity supplied to the integrated NEWNE regional grid of India figures has resulted in corresponding reduction of emission reduction achieved by the project activity in comparison to the estimates provided in the revised PDD approved on 17 February



2012 /5/. The emissions reductions reported in this monitoring period are 15 359 tonnes of CO<sub>2</sub> equivalents in the period from 15 March 2010 to 31 March 2011 (i.e. 382 days). The yearly expected emission reductions in the approved revised PDD are 23 880 tonnes of CO<sub>2</sub> equivalents, which corresponds to the emission reductions of 24 992 tCO<sub>2</sub>e in 382 days, and hence the reported emission reductions 15 359 tCO<sub>2</sub>e are 38.55% lower than the expected.

There is no other variation observed during the current verification except the one mentioned above that is different from what has been stated in the revised PDD approved on 17 February 2012 /5/.

### 3.4 Compliance of monitoring plan with monitoring methodology

DNV is able to confirm that the monitoring plan contained in the revised PDD approved on 17 February 2012 /5/ is in accordance with the approved methodology applied by the project activity, i.e. AMS-I.D (version 13) /29/.

### 3.5 Compliance of monitoring with the monitoring plan

The monitoring has been carried out in accordance with the monitoring plan contained in the revised PDD approved on 17 February 2012 /5/.

During the site visit conducted on 11 August 2011, it was found by the verification team that the monitoring equipments installed at project site and the monitoring practice practised at project site is not in compliance with the registered PDD /3/ (refer CAR 1 and CAR 2 provided in Appendix A of this report). Hence, DNV raised a corrective action request and requested project proponent to submit a notification of changes from the project activity as described in the registered project design document and request for revision of monitoring plan to UNFCCC. On 31 January 2012 an updated PDD along with the validation opinion on notification of changes from the project activity as described in the registered project design document and request for revision of monitoring plan was submitted to UNFCCC, which was approved on 17 February 2012 /5/ & /6/. DNV confirms that all parameters stated in the validated monitoring plan contained in revised PDD approved on 17 February 2012 /5/ are monitored and reported appropriately. The revised monitoring report /1/ lists each parameter required by the monitoring plan and the information flow (i.e. from data generation, aggregation, to recording, calculation and reporting) for these parameters is provided in the revised monitoring report. The information flow for the each parameter is further verified in the following sections. DNV confirms that no deviation to the monitoring plan has been requested to CDM Executive Board for the current verification period.

#### 3.5.1 Monitoring parameters

As required by the monitoring methodology AMS-I.D. (version 13) /29/ and monitoring plan of the revised PDD approved on 17 February 2012, monitoring of parameters essentially comprises:

**Quantity of fossil fuel type (diesel) combusted in the project plant ( $F_{d,y}$ ):** The quantity of diesel combusted in the diesel generator is measured continuously via level gauge installed at diesel generator tank and recorded on daily basis in plant log books and aggregated on monthly basis /15/.

**Total Electricity generated by the project activity ( $EG_{gross,y}$ ):** The total electricity generated by the project activity is measured continuously via calibrated electronic energy meters (Serial No: B 3260957 connected to Unit-I and Serial No: B 3260958 connected to Unit-II) of 1.0





accuracy class and recorded on daily basis in plant log books and aggregated on monthly basis /16/.

**Auxiliary electricity consumption of the project activity ( $EG_{\text{auxiliary y}}$ ):** The auxiliary electricity consumption of the project activity is measured continuously via calibrated energy meter (Serial No: 19599TM1106) of 1.0 accuracy class and recorded on daily basis in plant log books and aggregated on monthly basis /17/.

**Electricity supplied to the grid by the project activity ( $EG_{\text{export y}}$ ):** The electricity supplied to the grid by the project activity is measured continuously via one set of calibrated bi-directional main and check meters of 0.2s accuracy class installed at grid interconnection point and recorded on monthly basis in the form of joint meter reading certificates issued by Uttarakhand Power Corporation Limited (UPCL) and aggregated on annual basis /8/.

**Electricity imported from the grid by the project activity ( $EG_{\text{import y}}$ ):** The electricity imported from the grid by the project activity is measured continuously via one set of calibrated bi-directional main and check meters of 0.2s accuracy class installed at grid interconnection point and recorded on monthly basis in the form of joint meter reading certificates issued by Uttarakhand Power Corporation Limited (UPCL) and aggregated on annual basis /8/.

As per the power purchase agreement signed with UPCL /11/, the bi-directional energy meters (main and check meter) used to monitor electricity exported/imported to/from grid is to be calibrated on half yearly basis. However, it has been noted that the calibration for main meters with serial number 7007478 (used to monitor the electricity exported to the grid for the monitoring period 15 March 2010 to 31 August 2010) and 8039587 (used to monitor the electricity exported to the grid for the monitoring period 01 September 2010 to 31 March 2011) were delayed. Though the subsequent calibration conducted indicated that errors are within the acceptable accuracy limit /22/.

Hence, the electricity exported and imported to/from the grid has been adjusted by applying the maximum inaccuracy level of the meters (0.2%) on the measured value of the electricity exported and imported, in line with the guidance provided by CDM EB “Guidelines for assessing compliance with the calibration frequency requirement version 1” (Annex-60 of CDM-EB 52) /30/. A detailed working of application of correction factor is provided below:

Verification Period :	15 March 2010 to 31 March 2011	
Main meter serial number	7007478	8039587
Date of calibration	08 January 2010	28 July 2010
Due date of re-calibration	07 July 2010	27 January 2011
Period for which the meter has been used (to monitor electricity export/import to/from grid)	15 March 2010 to 31 August 2010	01 September 2010 to 31 March 2011
Period for which calibration was missing	08 July 2010 to 31 August 2010	28 January 2011 to 31 March 2011
Date on which the recalibration was performed	13 October 2010	15 September 2011
Error observed during the recalibration (Export/Import)	0.16%	0.12%



Maximum permissible error of the energy meter	0.2%	0.2%
Period for which correction factor has been applied	Since the joint meter reading for the month is recorded on first day of the month at 00:00 hours. As an Element of conservativeness correction factor due to delay in calibration is applied for the whole month (period from 1 July 2010 to 31 August 2010) /2/.	Since the joint meter reading for the month is recorded on first day of the month at 00:00 hours. As an Element of conservativeness correction factor due to delay in calibration is applied for the whole month (period from 1 January 2011 to 31 March 2011) /2/.
Electricity exported as per JMR Reading for the period	5268800 kWh (period from 1 July 2010 to 31 August 2010).	2689800 kWh (period from 1 January 2011 to 31 March 2011).
Electricity exported after applying correction factor for the period	5258262 kWh (period from 1 July 2010 to 31 August 2010).	2684420 kWh (period from 1 January 2011 to 31 March 2011).
Electricity Imported as per JMR Reading for the period	1300 kWh (period from 1 July 2010 to 31 August 2010).	700 kWh (period from 1 January 2011 to 31 March 2011).
Electricity Imported after applying correction factor for the period	1303 (period from 1 July 2010 to 31 August 2010).	701 kWh (period from 1 January 2011 to 31 March 2011).
Net electricity supplied after application of correction factor	5256960 (period from 1 July 2010 to 31 August 2010).	2683719 kWh (period from 1 January 2011 to 31 March 2011).

Similarly the calibration for check meters with serial number 7007475 (used to monitor the electricity exported to the grid for the monitoring period 15 March 2010 to 10 August 2010) and 8039591 (used to monitor the electricity exported to the grid for the monitoring period 11 August 2011 to 31 March 2011) were delayed /22/. However, the subsequent calibration conducted indicated that errors are within the acceptable accuracy limit. The electricity units measured through this meter is not linked to emission reduction as emission reduction claim is based on the main meters reading.





The following tables are related to the parameters in the monitoring plan / methodology:

	Assessment/ Observation
Data / Parameter: (as in monitoring plan of revised PDD approved on 17 February 2012):	EG <sub>gross y</sub> : Total electricity generated by the project during the year y (Serial No: B 3260957 connected to Unit-I and Serial No: B 3260958 connected to Unit-II).
Measuring frequency:	Continuously
Reporting frequency:	Recorded on daily basis in plant log books and aggregated on monthly basis /16/.
Is measuring and reporting frequency in accordance with the monitoring plan of the revised PDD approved on 17 February 2012 and monitoring methodology? (Yes / No)	Yes
Type of monitoring equipment:	Model: SR 489 (Electronic)
Is accuracy of the monitoring equipment as stated in the revised PDD approved on 17 February 2012? If the revised PDD approved on 17 February 2012 does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	Yes. The energy meters are of 1.0 accuracy class which is in line with the accuracy stated in the revised PDD which has been approved on 17 February 2012 /5/.
Calibration frequency /interval:	Once in a 3 year. Factory calibrated energy meters were tested and installed on 21 July 2007 /9/ which were recalibrated on 13 March 2010 and is valid till 12 March 2013/20/.
Is the calibration interval in line with the monitoring plan of the revised PDD approved on 17 February 2012? If the revised PDD approved on 17 February 2012 does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	As per the monitoring plan of the revised PDD approved on 17 February 2012 /5/, the total electricity generation meters will be calibrated as per industrial standards of energy meters, but at least once in three years. DNV confirms that as per Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006 /25/ all electronic energy meters are required to be calibrated at least once in a 5 years, hence in DNV's opinion the selected frequency of once in a 3 year period as prescribed in revised PDD approved on 17 February 2012 /5/ is appropriate and is in line with guidance provided in the general guidance for small scale methodologies version 18 /38/.
Company performing the calibration:	Transerect /20/
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes



Does the validity of the calibration(s) cover the whole reporting period? Show all calibration dates relevant for the reporting period	Yes. Factory calibrated energy meters were tested installed on 21 July 2007 /9/ which were recalibrated on 13 March 2010 and is valid till 12 March 2013 /20/.
If applicable, has the reported data been cross-checked with other available data?	Monthly plant performance reports /26/.
How were the values in the monitoring report verified?	Electricity generation data is recorded in log books on daily basis and aggregated on monthly basis/16/.
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes. Daily and monthly generation records are monitored on quarterly basis by the board of directors. The responsibility of review, storage and archiving of information in good condition lies with the General Manager.
In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	Not applicable

	Assessment/ Observation
Data / Parameter: (as in monitoring plan of revised PDD approved on 17 February 2012):	EG <sub>auxiliary</sub> : Auxiliary electricity consumption of the project activity (Auxiliary meter serial no: 19599TM1106)
Measuring frequency:	Continuously
Reporting frequency:	Recorded on daily basis in plant log books and aggregated on monthly basis /17/.
Is measuring and reporting frequency in accordance with the monitoring plan of the revised PDD approved on 17 February 2012 and monitoring methodology? (Yes / No)	Yes
Type of monitoring equipment:	Model: TM7400 (Electronic)
Is accuracy of the monitoring equipment as stated in the revised PDD approved on 17 February 2012? If the revised PDD approved on 17 February 2012 does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	Yes. The auxiliary consumption energy meter is of 1.0 accuracy class which is in line with the accuracy state in revised PDD approved on 17 February 2012/5/.
Calibration frequency /interval:	Once in a 3 year.



	Factory calibrated energy meter was tested and installed on 21 July 2007 /9/ which were recalibrated on 13 March 2010 and is valid till 12 March 2013 /21/.
Is the calibration interval in line with the monitoring plan of the revised PDD approved on 17 February 2012? If the revised PDD approved on 17 February 2012 does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	As per the monitoring plan of the revised PDD approved on 17 February 2012 /5/, the auxiliary consumption meter will be calibrated as per industrial standards of energy meters, but at least once in three years. DNV confirms that as per Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006 /25/ all electronic energy meters are required to be calibrated at least once in a 5 years, hence in DNV's opinion the selected frequency of once in a 3 year period as prescribed in revised PDD approved on 17 February 2012 /5/ is appropriate and is in line with guidance provided in the general guidance for small scale methodologies version 18 /38/.
Company performing the calibration:	Transerect /21/
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes
Does the validity of the calibration(s) cover the whole reporting period? Show all calibration dates relevant for the reporting period	Yes. Factory calibrated energy meter was tested and installed on 21 July 2007 /9/ which were recalibrated on 13 March 2010 and is valid till 12 March 2013 /21/.
If applicable, has the reported data been cross-checked with other available data?	Monthly plant performance reports /26/.
How were the values in the monitoring report verified?	Electricity consumption data is recorded in log books on daily basis and aggregated on monthly basis /17/.
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes. Daily and monthly auxiliary consumption records are monitored on quarterly basis by the board of directors. The responsibility of review, storage and archiving of information in good condition lies with the General Manager.
In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	Not applicable



	Assessment/ Observation
Data / Parameter: (as in monitoring plan of revised PDD approved on 17 February 2012):	<p>Electricity supplied to the grid by the project during the year y (<math>EG_{\text{export } y}</math>) and grid electricity import to the project activity during the year y (<math>EG_{\text{import } y}</math>) are monitored by one set of bi-directional main and check meters.</p> <p>Main meters with serial number 7007478 (used to monitor the electricity exported/Imported to/from grid for the monitoring period 15 March 2010 to 31 August 2010) and serial number 8039587 (used to monitor the electricity exported/imported to/from grid for the monitoring period 01 September 2010 to 31 March 2011).</p> <p>Check meters with serial number 7007475 (used to monitor the electricity exported to the grid for the monitoring period 15 March 2010 to 10 August 2010) and serial number 8039591 (used to monitor the electricity exported to the grid for the monitoring period 11 August 2011 to 31 March 2011).</p>
Measuring frequency:	Continuously
Reporting frequency:	Recorded jointly in the form of joint meter readings certificates issued by UPCL /8/.
Is measuring and reporting frequency in accordance with the monitoring plan of the revised PDD approved on 17 February 2012 and monitoring methodology? (Yes / No)	Yes
Type of monitoring equipment:	Model No: ERP 300, Electronic Tri-vector Bidirectional meters.
Is accuracy of the monitoring equipment as stated in the revised PDD approved on 17 February 2012? If the revised PDD approved on 17 February 2012 does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	Yes. The electricity export/import (bi-directional) energy meter is of 0.2s accuracy class which is in line with the accuracy state in revised PDD approved on 17 February 2012 /5/.
Calibration frequency /interval:	Half yearly as per PPA /11/
Is the calibration interval in line with the monitoring plan of the revised PDD approved on 17 February 2012? If the revised PDD approved on 17 February 2012 does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	Yes



Company performing the calibration:	UPCL –Meter Testing Lab (authorized by government of Uttarakhand) /22/
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes
Does the validity of the calibration(s) cover the whole reporting period? Show all calibration dates relevant for the reporting period	<p>No,</p> <p>As per the power purchase agreement signed with UPCL/11/, the bi-directional energy meters (main and check meter) used to monitor electricity exported/imported to/from grid is to be calibrated on half yearly basis. However it has been noted that the calibration for main meters with serial number 7007478 (used to monitor the electricity exported to the grid for the monitoring period 15 March 2010 to 31 August 2010) and 8039587 (used to monitor the electricity exported to the grid for the monitoring period 01 September 2010 to 31 March 2011) were delayed. Though the subsequent calibration conducted indicated that errors are within the acceptable accuracy limit. Hence, the electricity exported and imported to/from the grid has been adjusted by applying the maximum inaccuracy level of the meters (0.2%) on the measured value of the electricity exported and imported, in line with the guidance provided by CDM EB “Guidelines for assessing compliance with the calibration frequency requirement version 1” (Annex-60 of CDM-EB 52) /30/. A detailed working of application of correction factor is provided in section B.3.5.1 of report.</p> <p>Similarly the calibration for check meters with serial number 7007475 (used to monitor the electricity exported to the grid for the monitoring period 15 March 2010 to 10 August 2010) and 8039591 (used to monitor the electricity exported to the grid for the monitoring period 11 August 2011 to 31 March 2011) were delayed. However, the subsequent calibration conducted indicated that errors are within the acceptable accuracy limit. The electricity units measured through this meter is not linked to emission reduction as emission reduction claim is based on the main meters reading.</p>
If applicable, has the reported data been cross-checked with other available data?	Yes net electricity supplied to the grid figures were cross checked against the sales invoices



	raised to UPCL by project proponent and payment received from UPCL for net electricity sold /7/.
How were the values in the monitoring report verified?	Joint meter readings certificates issued by UPCL /8/.
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes. Monthly electricity export and import records are monitored on quarterly basis by the board of directors. The responsibility of review, storage and archiving of information in good condition lies with the General Manager.
In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	Not applicable

	Assessment/ Observation
Data / Parameter: (as in monitoring plan of revised PDD approved on 17 February 2012):	Quantity of fossil fuel type i (diesel) combusted in the project plant ( $F_{iy}$ )
Measuring frequency:	Continuously
Reporting frequency:	Recorded on daily basis in D.G. Set log books and aggregated on monthly basis /15/.
Is measuring and reporting frequency in accordance with the monitoring plan of the revised PDD approved on 17 February 2012 and monitoring methodology? (Yes / No)	Yes
Type of monitoring equipment:	Level Gauge Make: Powerka, Model No. : 225MM
Is accuracy of the monitoring equipment as stated in the revised PDD approved on 17 February 2012? If the revised PDD approved on 17 February 2012 does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	The revised PDD approved on 17 February 2012 /5/ does not specify any accuracy of the monitoring equipment. As per the equipment supplier the permissible error limit for the level gauge is $\pm 2\%$ /23/. In DNV's opinion the accuracy of the level gauge represents good monitoring practice for the application.
Calibration frequency /interval:	Once in a 3 year.
Is the calibration interval in line with the monitoring plan of the revised PDD	As per the monitoring plan of the revised PDD approved on 17 February 2012 /5/, the level





approved on 17 February 2012? If the revised PDD approved on 17 February 2012 does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	gauge will be calibrated as per national standards, but at least once in three years. DNV has checked the weights and measures act 1976 (national standard) /27/ and confirms that there is no requirement of calibration of weight measurement equipments used for internal purposes. Hence in DNV's opinion the selected frequency of once in a 3 year period as prescribed in revised PDD approved on 17 February 2012 /5/ is appropriate and is in line with guidance provided in the general guidance for small scale methodologies version 18 /38/.
Company performing the calibration:	Powerka
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes
Does the validity of the calibration(s) cover the whole reporting period? Show all calibration dates relevant for the reporting period	Factory calibrated level gauge was tested and installed on 21 July 2007 /9/ and this calibration was valid till 20 July 2010. No further calibration of level gauge was performed. Hence as a conservative approach, for the current verification total diesel procured during the current monitoring period has been considered as consumed. This resulted in overestimation of project emissions in comparison to project emissions calculated based on the actual diesel consumed.
If applicable, has the reported data been cross-checked with other available data?	Yes the total diesel consumed figures are compared against the stock balance prepared based on diesel procured invoices and left over diesel in stock /18/. The diesel procured quantity has been further cross checked against the payment records /18/.
How were the values in the monitoring report verified?	For the current verification total diesel procured during the current monitoring period has been considered as consumed. This resulted in overestimation of project emissions in comparison to project emissions calculated based on the actual diesel consumed. The diesel procured quantity has been checked from the diesel procurement invoices and cross checked against the payment records /18/.
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes. Monthly diesel consumption and procurement records are monitored on quarterly basis by the board of directors. The responsibility of review, storage and archiving of information in good condition lies with the General Manager.



In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	Not applicable
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### 3.6 Assessment of data and calculation of emission reductions

DNV confirms that appropriate methods and formulae for calculating baseline emissions, project emissions and leakage have been followed, and the assumptions, emission factors and default values that are applied in the calculation have been justified.

As stated in the section 1.4, the emission reductions  $ER_y$  by the project activity during the monitoring period are the difference between the baseline emission and project emissions.

Emission Reduction ( $ER$ ) = Baseline emission – Project emissions.

$$ER_y = BE_y - PE_y$$

#### 3.6.1 Baseline emissions

**Baseline emissions:** The project's baseline emissions are determined as the product of the net electricity supplied to the integrated NEWNE regional grid of India by the project activity and the combined margin emission factor of the integrated NEWNE regional grid of India.

$$BE_y = EG_y \times EF_y$$

Where,

$EG_y$  is the net electricity supplied to the integrated NEWNE regional grid of India by the project activity. The net electricity supplied to the integrated NEWNE regional grid of India is calculated as a difference of electricity exported to the integrated NEWNE regional grid of India by the project activity ( $EG_{\text{export}, y}$ ) and electricity imported from the integrated NEWNE regional grid of India by the project activity ( $EG_{\text{import}, y}$ ). The net electricity supplied to the grid has been sourced from the monthly joint meter readings (JMR) carried out jointly by UPCL and Chamoli Hydro Power Pvt. Ltd representatives /8/. The same forms the basis of emission reduction calculation and DNV was able to cross check this data with the monthly sales invoices raised to UPCL by project proponent/7/. For the current monitoring period 15 March 2010 to 31 March 2011, the project activity has supplied 18.97 GWh of net electricity (after applying the correction factor due to delay in calibrations for the main meters) to the integrated NEWNE regional grid of India /8/.

$EF_y$  is the combined margin emission factor of the integrated NEWNE regional grid of India to which the project is connected and was determined and validated *ex-ante* as 810.46 tCO<sub>2</sub>/GWh and will not be updated during the entire fixed crediting period /5/ and has been verified to be correct based on the availability of grid data /19/.

Hence,

$EG_y = EG_{\text{export}} - EG_{\text{import}} = 18.97$  GWh (after applying the correction factor due to delay in calibrations for the main meters), and

$$BE_y = EF_y \times EG_y = 15374 \text{ tCO}_2\text{e}$$





### 3.6.2 It has been confirmed by DNV that the maximum output capacity has not been exceeded on any given month during the monitoring period (15 March 2010 to 31 March 2011). Project emissions

**Project Emissions:** As the project activity is equipped with 63 kVA diesel generator to meet emergency power requirement of the power plant. Hence emission due to diesel consumption in diesel generator has been considered as project emissions /2/. The project emissions are calculated as:

$$PE_{diesel\ i} = F_{i,y} \times Density_i \times NCV_{diesel} \times EF_{CO2\ i} \times OXID / 10^6 \text{ (in tCO}_2\text{e)}.$$

Where,

$F_{i,y}$  = Quantity of diesel consumed in diesel generator during the verification period, measured via level gauge installed at diesel generator tank and recorded on daily basis in D.G. Set log books and aggregated on monthly basis /15/. During the current verification period (15 March 2010 to 31 March 2011), the project proponent has procured 5 120 litres /18/ of diesel for project activity and consumed 2 866 litres of diesel in diesel generator /2/. However during the site visit it was observed that on 21 July 2007 a factory calibrated level gauge was tested and installed to monitor the diesel consumption /9/, the calibration of level gauge was valid till 20 July 2010. No further calibration of level gauge was performed. Hence as a conservative approach, for the current verification (15 March 2010 to 31 March 2011), total diesel procured (5 120 litres) during the current monitoring period has been considered as consumed. Application of total diesel procured as consumed for project emission calculation resulted in overestimation of project emissions (15 tCO<sub>2</sub>) in comparison to project emissions calculated based on the actual diesel consumed (8 tCO<sub>2</sub>).

Density<sub>i</sub> = Density of diesel, fixed *ex-ante* based on the fuel characteristics published by the Indian Oil Corporation Limited (one of the major manufacturer and supplier of diesel in India) and the value applied is 0.845 Kg/Liter /13/.

NCV<sub>diesel</sub> = Net calorific value of diesel, fixed *ex-ante* based on the IPCC 2006 upper bound value at 95% confidence interval and the value applied is 43.3 TJ/Gg /14/.

EF<sub>CO2 i</sub> = Emission factor of diesel, fixed *ex-ante* based on the IPCC 2006 upper bound value at 95% confidence interval and the value applied is 74.8 tCO<sub>2</sub>/TJ /14/.

OXID = oxidation factor of diesel, as per IPCC 2006 Tier 1 sectoral approach, the oxidation factor of diesel is already taken into account while calculating the emission factor for diesel. Hence no separate value for oxidation factor of diesel is required to be used for project emission calculation /14/.

### 3.6.3 Leakage

**Leakage:** as the project activity is new grid connected project and involves installation of new equipments leakage is considered to be zero as also stated in the revised Project Design Document approved by UNFCCC on 17 February 2012 /5/.

### 3.6.4 Emission reductions

Therefore, the emission reductions in this monitoring period are:

$$ER_y = BE_y - PE_y = 15\,374 - 15 = 15\,359 \text{ tCO}_2\text{e}.$$

The emissions reductions reported in this monitoring period are 15 359 tonnes of CO<sub>2</sub> equivalents in the period from 15 March 2010 to 31 March 2011 (i.e. 382 days). The yearly expected emission reductions in the revised PDD approved by UNFCCC on 17 February 2012



/5/ are 23 880 tonnes of CO<sub>2</sub> equivalents, which corresponds to the emission reductions of 24 992 tCO<sub>2e</sub> in 382 days, and hence the reported emission reductions 15 359 tCO<sub>2e</sub> are 38.55% lower than the expected /2/.

As outlined above, the input data for calculating the emission reductions, the calculating process and the result are complete and transparent. Therefore, DNV is able to confirm the accuracy of the emission reductions.

### 3.7 Quality of evidence to determine emission reductions

DNV confirms that a complete set of data for this monitoring period (15 March 2010 to 31 March 2011) was available to be verified and was in accordance with the revised PDD approved by UNFCCC on 17 February 2012 /5/.

The net electricity supplied to the grid has been sourced from the monthly joint meter readings (JMR) carried out jointly by UPCL and Chamoli Hydro Power Pvt. Ltd representatives /8/. The same forms the basis of emission reduction calculation and DNV was able to cross check this data with the monthly sales invoices raised to UPCL by project proponent/7/. Accessibility to the sub-station meters is limited and controlled. The sub-station meters are sealed by UPCL and the seal can only be broken by UPCL in the presence of Chamoli Hydro Power Pvt. Ltd representatives. The JMR readings record both import and export data by the project activity /8/.

During the current verification period (15 March 2010 to 31 March 2011), the project proponent has procured 5 120 litres of diesel for project activity and consumed 2 866 litres of diesel in diesel generator /2/. However, during the site visit it was observed that on 21 July 2007 a factory calibrated level gauge was tested and installed /9/ to monitor the diesel consumption, the calibration of level gauge was valid till 20 July 2010. No further calibration of level gauge was performed. Hence, as a conservative approach, for the current verification (15 March 2010 to 31 March 2011), total diesel procured (5120 litres) during the current monitoring period has been considered as consumed. This resulted in overestimation of project emissions (15 tCO<sub>2</sub>) in comparison to project emissions calculated based on the actual diesel consumed (8 tCO<sub>2</sub>).

All necessary documentation were collected, referenced and aggregated and were easily accessible in hard-copy and electronic format. Measurements are performed by calibrated equipment, and the key data were cross-checked via other sources. No assumptions are used that have any material influence on reported emission reductions.

### 3.8 Management system and quality assurance

Chamoli Hydro Power Pvt. Ltd is responsible for the operation and maintenance of the project, the monitoring equipment and data collection. The management system for the project has been verified to be in place during the site visit by DNV. The organization structure with the responsibilities, personnel competencies, monitoring procedure and monitoring management have been properly identified and put into operation.

DNV confirms that the responsibilities and authorities in the management and operational system for monitoring and reporting are in accordance with the responsibilities and authorities stated in the monitoring plan of the revised PDD approved by UNFCCC on 17 February 2012 /5/.



## 4 CERTIFICATION STATEMENT

*DNV Climate Change Services AS (DNV) has performed the verification of the emission reductions that have been reported for the “5 MW Debal Grid-connected Hydroelectric Project in Uttarakhand, India” (UNFCCC Registration Reference No. 2965) for the period 15 March 2010 to 31 March 2011.*

*The project participants are responsible for the collection of data in accordance with the monitoring plan and the reporting of GHG emissions reductions from the project.*

*It is DNV's responsibility to express an independent verification statement on the reported GHG emission reductions from the project.*

*DNV conducted the verification on the basis of the monitoring methodology AMS-I.D (version 13), the monitoring plan contained in the revised Project Design Document approved by UNFCCC on 17 February 2012 and the revised monitoring report (version 02) dated 23 April 2012. The verification included i) checking whether the provisions of the monitoring methodology and the monitoring plan were consistently and appropriately applied and ii) the collection of evidence supporting the reported data.*

*DNV's verification approach draws on an understanding of the risks associated with reporting of GHG emission data and the controls in place to mitigate these. DNV planned and performed the verification by obtaining evidence and other information and explanations that DNV considers necessary to give reasonable assurance that reported GHG emission reductions are fairly stated.*

*In our opinion the GHG emissions reductions of the “5 MW Debal Grid-connected Hydroelectric Project in Uttarakhand, India” (UNFCCC Registration Ref. No. 2965) for the period 15 March 2010 to 31 March 2011 are fairly stated in the revised monitoring report (version 02) dated 23 April 2012.*

*The GHG emission reductions were calculated correctly on the basis of the approved baseline and monitoring methodology AMS-I.D (version 13) and the monitoring plan contained in the PDD approved by UNFCCC on 17 February 2012.*

*DNV Climate Change Services AS is able to certify that the emission reductions from the “5 MW Debal Grid-connected Hydroelectric Project in Uttarakhand, India” during the period 15 March 2010 to 31 March 2011 amount to 15 359 tonnes of CO<sub>2</sub> equivalent.*

Bangalore and Oslo, 2012-05-23

Gaurav Srivastava  
Verifier  
DNV Bangalore, India

Michael Lehmann  
Director of Services and Technologies  
DNV Climate Change Services AS



## 5 REFERENCES

*Documents provided by the Project Participants that relate directly to the GHG components of the project. These have been used as direct sources of evidence for the periodic verification conclusions, and are usually further checked through interviews with key personnel.*

- /1/ Chamoli Hydro Power Pvt. Ltd: Monitoring Report for “5 MW Debal Grid-connected Hydroelectric Project in Uttarakhand, India” project for the period from 15 March 2010 to 31 March 2011, webhosted version 01 dated 08 July 2011 and revised version 02 dated 23 April 2012.
- /2/ Chamoli Hydro Power Pvt. Ltd: Emission reduction spread sheet for “5 MW Debal Grid-connected Hydroelectric Project in Uttarakhand, India” project for the period from 15 March 2010 to 31 March 2011, webhosted version 01 dated 08 July 2011 and revised version 02 dated 23 April 2012.
- /3/ Chamoli Hydro Power Pvt. Ltd: Registered PDD for “5 MW Debal Grid-connected Hydroelectric Project in Uttarakhand, India” version 04 dated 16 January 2010.
- /4/ DNV: Validation Report No: 2007-1016 Rev 04 for validation of “5 MW Debal Grid-connected Hydroelectric Project in Uttarakhand, India” dated 02 February 2010.
- /5/ Chamoli Hydro Power Pvt. Ltd: Updated PDD approved on 17 February 2012 by CDM EB for “5 MW Debal Grid-connected Hydroelectric Project in Uttarakhand, India” version 05 dated 30 September 2011.
- /6/ DNV: Validation Opinion dated 31 January 2012- Combined notification / request for approval of changes from the project activity as described in the registered project design document and request for revision of the monitoring plan approved by CDM EB on 17 February 2012.
- /7/ Chamoli Hydro Power Pvt. Ltd.: Monthly invoices raised to UPCL for net electricity exported to the grid and payment received for the net electricity sold for the period from 15 March 2010 to 31 March 2011.
- /8/ UPCL: Monthly joint meter reading certificates issued by UPCL for electricity export/import to/from grid for the period from 15 March 2010 to 31 March 2011.
- /9/ UPCL: Chamoli hydro power plant synchronization certificate issued to Chamoli Hydro Power Pvt. Ltd dated 23 July 2007 stating that both the units were synchronised to grid on 21 July 2007 after testing of all equipment and meters.
- /10/ M/s Boving Fouress: Technical Specification sheets for Turbine and generators.
- /11/ UPCL: Power purchase agreement signed between Chamoli Hydro Power Pvt. Ltd and UPCL dated 22 May 2006.
- /12/ UPCL: letter of start of commercial operation of Chamoli Hydro Power plant issued by UPCL for the project activity dated 21 July 2007.



- /13/ IOCL: Density of diesel is sourced from fuel characteristics published by the Indian Oil Corporation Limited (one of the major manufacturer and supplier of diesel in India).  
[http://www.iocl.com/Products/HSD\\_BS\\_IV\\_Specification.pdf](http://www.iocl.com/Products/HSD_BS_IV_Specification.pdf)
- /14/ IPCC: 2006 IPCC Guidelines for National Greenhouse Gas Inventories.
- /15/ Chamoli Hydro Power Pvt. Ltd.: Diesel consumption log book covering the data records for the verification period from 15 March 2010 to 31 March 2011.
- /16/ Chamoli Hydro Power Pvt. Ltd.: Plant log book records for total electricity generated by the project activity recorded on daily basis in plant log books and aggregated on monthly basis for the verification period from 15 March 2010 to 31 March 2011..
- /17/ Chamoli Hydro Power Pvt. Ltd.: Plant log book records for auxiliary consumption of the project activity recorded on daily basis in plant log books and aggregated on monthly basis for the verification period from 15 March 2010 to 31 March 2011.
- /18/ Chamoli Hydro Power Pvt. Ltd.: Diesel purchase invoices, stock balance prepared for diesel and payment made against the diesel purchase records for the verification period from 15 March 2010 to 31 March 2011.
- /19/ CEA: CO2 Baseline Database for the Indian Power Sector. Version 03, Date: March 2011.  
[http://www.cea.nic.in/reports/planning/cdm\\_co2/cdm\\_co2.htm](http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm)
- /20/ Transerect: calibration performed for total electricity generation meters (Serial No: B 3260957 connected to Unit-I and Serial No: B 3260958 connected to Unit-II):
- Factory calibrated meter tested and installed on 21 July 2007
  - Recalibration performed on 13 March 2010 and is valid from 13 March 2010 to 12 March 2013.
- /21/ Transerect: calibration performed for total Auxiliary consumption meter (Serial No: 19599TM1106):
- Factory calibrated meter tested and installed on 21 July 2007
  - Recalibration performed on 13 March 2010 and is valid from 13 March 2010 to 12 March 2013.
- /22/ UPCL: Calibration performed for export-import bidirectional energy meter:
- Main Meter: Serial Number 7007478: used to monitor electricity exported/imported to/from grid for the period from 15 March 2010 to 31 August 2010, calibrated on 08 January 2010 and was valid till 07 July 2010 and recalibrated on 13 October 2010.
  - Main Meter: Serial Number 8039587: used to monitor electricity exported/imported to/from grid for the period from 01 September 2010 to 31 March 2011, calibrated on 28 July 2010 and was valid till 27 January 2011 and was recalibrated on 15 September 2011.
  - Check Meter: Serial Number 7007475: used to monitor electricity exported/imported to/from grid for the period from 15 March 2010 to 10 August 2010, calibrated on 03 December 2009 and was valid till 02 June 2010.
  - Check Meter: Serial Number 8039587: used to monitor electricity exported/imported to/from grid for the period from 11 August 2010 to 31 March 2011, calibrated on 28 July 2010 and was valid till 27 January 2011.
- /23/ Powerka: Level gauge used to monitor diesel consumption, factory calibrated level gauge was tested and installed on 21 July 2007 and technical specification sheet of level gauge specification.



- /24/ Chamoli Hydro Power Pvt. Ltd.: Down time and operation and maintenance records for the period from 15 March 2010 to 31 March 2011.
- /25/ CEA: Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006.
- /26/ Chamoli Hydro Power Pvt. Ltd.: Monthly plant performance reports for the period from 15 March 2010 to 31 March 2011 and internal audit reports covering the verification period from 15 March 2010 to 31 March 2011.
- /27/ Department of weights and Measures, Government of India: weights and measures act 1976 (national standard).

*Background documents related to the design and/or methodologies employed in the design or other reference documents.*

- /28/ CDM Executive Board: Validation and Verification Manual. Version 1.2
- /29/ CDM Executive Board: AMS-I.D “Grid connected renewable electricity generation”, version 13.
- /30/ CDM Executive Board: “Guidelines for assessing compliance with the calibration frequency requirements”, CDM-EB 52, Annex 60.
- /31/ CDM Executive Board: Procedures for revising monitoring plans in accordance with paragraph 57 of the modalities and procedures for the CDM project, CDM-EB 49, Annex 28.
- /32/ CDM Executive Board: Procedures for notifying and requesting approval of changes from the project activity as described in the registered project design document, CDM-EB 48, Annex 66.
- /33/ CDM Executive Board: CDM EB clarification provided in 59<sup>th</sup> meeting report Para 66 “where a DOE identifies both changes from the project activity, as described in the registered PDD, and changes to the registered monitoring plan, those changes may be included in one submission under these procedures”.
- /34/ CDM Executive Board: Guidelines for completing the monitoring report form (CDM-MR) version 01, EB 54, Annex 34.
- /35/ CDM Executive Board: Guidance on assessment of different types of changes from the project activity as described in the registered project design document, CDM-EB 48, Annex 67.
- /36/ CDM Executive Board: Guidelines on completeness check of request for issuance, EB 48, Annex 68.
- /37/ CDM Executive Board: Issuance - Completeness check checklist (Version 2.0)  
CDM Executive Board: Issuance - Information and Reporting checklist (Version 2.0)
- /38/ CDM Executive Board: General guidance for small scale methodologies version 18



*Persons interviewed during the initial verification, or persons who contributed with other information that are not included in the documents listed above.*

- /39/ Prem Singh Rawat: Engineer UPCL 33/11 kV Substation
- /40/ J.Srivaiah: Plant Manager CHPPL
- /41/ P.Rahguvanshi Reddy : General Manager CHPPL
- /42/ B. Sadasiva Reddy: Director CHPPL
- /43/ P. Harsha Vardhan Reddy : Zenith Energy Services
- /44/ Rajinder Singh: Accountant CHPPL
- /45/ S. Mujahid: Shift In charge CHPPL
- /46/ G. Srinivasa Reddy: Shift In charge CHPPL

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## **APPENDIX A**

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### **CORRECTIVE ACTION REQUESTS, CLARIFICATION REQUESTS AND FORWARD ACTION REQUESTS**



**Corrective action requests**

<b>CAR ID</b>	<b>Corrective action request</b>	<b>Response by Project Participants</b>	<b>DNV's assessment of response by Project Participants</b>
<b>CAR 1</b>	<p>Implementation of the CDM project activity does not conform to the description contained in the registered PDD in the following respect.</p> <ul style="list-style-type: none"> <li>(a) As per the technical specifications provided in the registered PDD, the rated capacity of the two generators was 2500 kVA each; however the name plate capacities of the generators installed at site were found to be 3125 kVA each.</li> <li>(b) As per the registered PDD the design head for the project activity was 47.2 m, however during review of the drawing at site it was found to be 42 m.</li> </ul> <p>Hence, in line with the requirement of VVM Para 197 project proponent to submit a notification of changes from the project activity as described in the registered project design document and request for revision of monitoring plan to UNFCCC.</p>	<p>The changes have been notified to CDM-EB and the same has been approved by CDM-EB on 17.02.2012. The MR has been revised accordingly.</p>	<p>The project proponent has updated the PDD to reflect these changes and on 31 January 2012 an updated PDD along with the validation opinion on notification of changes from the project activity as described in the registered project design document and request for revision of monitoring plan to UNFCCC, which was approved on 17 February 2012 /5/ &amp; /6/ .</p> <p><a href="http://cdm.unfccc.int/Projects/DB/DNV-CUK1252576926.35/view">http://cdm.unfccc.int/Projects/DB/DNV-CUK1252576926.35/view</a></p> <p>OK Accepted CAR 1 is closed.</p>

CAR ID	Corrective action request	Response by Project Participants	DNV's assessment of response by Project Participants
<b>CAR 2</b>	<p>The monitoring equipment for measurement of gross electricity, auxiliary consumption and diesel consumption at site were found not in line with the monitoring plan of the registered PDD.</p> <p>As the monitoring plan implemented at site does not reflect the actual monitoring activity based on the registered PDD, the project proponent is requested to seek revision of the monitoring plan in line with the requirements of VVM Para 216 and EB 'procedures for revising monitoring plans' (EB 49, Annex 28).</p>	<p>The monitoring plan of the project activity has been revised and the same has been approved by Executive Board on 17.02.2012. The MR has been revised accordingly and the same is submitted to DOE.</p>	<p>The project proponent has updated the PDD to reflect these changes and on 31 January 2012 an updated PDD along with the validation opinion on notification of changes from the project activity as described in the registered project design document and request for revision of monitoring plan to UNFCCC, which was approved on 17 February 2012 /5/ &amp; /6/ .</p> <p><a href="http://cdm.unfccc.int/Projects/DB/DNV-CUK1252576926.35/view">http://cdm.unfccc.int/Projects/DB/DNV-CUK1252576926.35/view</a></p> <p>OK Accepted CAR 2 is closed.</p>

CAR ID	Corrective action request	Response by Project Participants	DNV's assessment of response by Project Participants
<b>CAR 3</b>	The project proponent is requested to demonstrate compliance to the 'EB Guidelines for assessing compliance with the calibration frequency requirements' for the delay in calibration of the main and check meters for measurement of the net electricity.	As per the valid Power Purchase Agreement (PPA) the calibration frequency of energy meters is once in every six months. But during the current monitored period there was delay in calibration, for which PP has applied delay calibration calculations and the same is incorporated in the revised Monitoring Report.	As per the power purchase agreement signed with UPCL, the bi-directional energy meters (main and check meter) used to monitor electricity exported/imported to/from grid is to be calibrated on half yearly basis /11/. However it has been noted that the calibration for main meters with serial number 7007478 (used to monitor the electricity exported to the grid for the monitoring period 15 March 2010 to 31 August 2010) and 8039587 (used to monitor the electricity exported to the grid for the monitoring period 01 September 2010 to 31 March 2011) were delayed /22/. Though the subsequent calibration conducted indicated that errors are within the acceptable accuracy limit /22/. Hence, the electricity exported and imported to/from the grid has been adjusted by applying the maximum inaccuracy level of the meters (0.2%) on the measured value of the electricity exported and imported, in line with the guidance provided by CDM EB "Guidelines for assessing compliance with the calibration frequency requirement version 1" (Annex-60 of CDM-EB 52) /30/. A detailed working of application of correction factor is provided in section 3.5.1 of this report.

CAR ID	Corrective action request	Response by Project Participants	DNV's assessment of response by Project Participants
			<p>Similarly the calibration for check meters with serial number 7007475 (used to monitor the electricity exported to the grid for the monitoring period 15 March 2010 to 10 August 2010) and 8039591 (used to monitor the electricity exported to the grid for the monitoring period 11 August 2011 to 31 March 2011) were delayed. However the subsequent calibration conducted indicated that errors are within the acceptable accuracy limit. The electricity units measured through this meter is not linked to emission reduction as emission reduction claim is based on the main meters reading.</p> <p>OK Accepted. CAR 3 is closed.</p>
<b>CAR 4</b>	The values of ex-ante parameters used to calculate project emission due to diesel consumption were not in line with the requirement of the "Tool to calculate project or leakage CO <sub>2</sub> emissions from fossil fuel combustion".	The values of <i>ex-ante</i> parameters have been revised in Rev. CDM-PDD and the same has been approved by EB on 17.02.2012.	<p>The project proponent has updated the <i>ex-ante</i> fixed parameters in registered PDD and on 31 January 2012 an updated PDD along with the validation opinion on notification/approval of changes from the project activity as described in the registered project design document and request for revision of monitoring plan was submitted to UNFCCC, which got approved on 17 February 2012 /5/ &amp; /6/.</p> <p>OK Accepted CAR 4 is closed.</p>

CAR ID	Corrective action request	Response by Project Participants	DNV's assessment of response by Project Participants
<b>CAR 5</b>	<p>Project proponent to provide the following documents</p> <ol style="list-style-type: none"> <li>1. Revised monitoring report in line with the requirement of 'Guidelines for completing the monitoring report form (CDM-MR)', EB 54 Annex 34.</li> <li>2. Technical specifications of diesel generator, power transformer and auxiliary transformer need to be incorporated in the monitoring report.</li> <li>3. Calibration records of the level gauge used for measuring the diesel consumption for the diesel generator at site.</li> </ol> <p>During the document review it was found that the emission reduction spread sheet submitted does not meets the requirement of "Guidelines on completeness check of requests for issuance", EB 48, Annex 68 as:</p> <p>a) Explanation with regard to application of formulae in the spreadsheet.</p>	<p>The Calibration details of all monitoring equipment's have been incorporated in revised MR.</p> <p>The Technical specifications of diesel generator, power transformer and auxiliary transformer and the amount of diesel consumption has been incorporated in revised MR.</p> <p>A factory calibrated level gauge was tested on installed on 21 July 2007; to monitor the diesel consumption was the calibration was valid till 20 July 2010. No further calibration of level gauge was performed.</p> <p>Hence, as a conservative approach for the current verification (15 March 2010 to 31 March 2011) we have considered total diesel procured (5120 litres) during the current monitoring period as consumed.</p> <p>The excel sheet has been revised accordingly.</p>	<p>Project proponent has revised the monitoring report in line with the requirement of 'Guidelines for completing the monitoring report form (CDM-MR)', EB 54 Annex 34 /34/.</p> <p>Revised MR version 02 dated 23 April 2012 has been reviewed by DNV /1/.</p> <p>Technical specifications of diesel generator, power transformer and auxiliary transformer and the amount of diesel consumption have been incorporated in revised MR dated 23 April 2012 /1/.</p> <p>Revised MR version 02 dated 23 April 2012 has been reviewed by DNV /1/.</p> <p>Technical specifications of diesel generators have been verified by DNV /10/.</p> <p>During the current verification period (15 March 2010 to 31 March 2011), the project proponent has procured 5120 litres/18/ of diesel for project activity and consumed 2866 litres of diesel in diesel generator /2/. However during the site visit it was observed that on 21 July 2007 a factory calibrated level gauge was tested and installed to monitor the diesel consumption, the calibration of level gauge was valid till 20 July 2010. No further calibration of level gauge was performed. Hence as a conservative approach, for the current verification (15 March 2010 to 31 March 2011), total diesel procured (5120 litres) during the current monitoring period has been considered as consumed. This resulted in overestimation of project emissions (15 tCO<sub>2</sub>) in comparison to project emissions calculated based on the actual diesel consumed (8 tCO<sub>2</sub>) /2/.</p>

CAR ID	Corrective action request	Response by Project Participants	DNV's assessment of response by Project Participants
			<p>Project proponent has revised the emission reduction spread sheet /2/ in line with the requirement of "Guidelines on completeness check of requests for issuance", EB 48, Annex 68 /36/.</p> <p>Revised emission reduction spread sheet version 02 dated 23 April 2012 has been reviewed by DNV /2/.</p> <p>OK Accepted. CAR 5 is closed.</p>

## Clarification requests

CL ID	Clarification request	Response by Project Participants	DNV's assessment of response by Project Participants
CL 1	PP is requested to provide an explanation of the cause of difference in the actual emission reductions achieved during the current monitoring period than that stated in the registered PDD.	<p>During the monitoring period are 15,359 tCO<sub>2</sub>, which is 38.55% less than the estimated 24,992 tCO<sub>2</sub> (for 382 days) as mentioned in CDM-PDD. The main reasons:</p> <ol style="list-style-type: none"> <li>1) More no. of grids failures, due to which the plant was forced to shut down most of the time.</li> <li>2) More rainfalls in the project region, the project activity was forced to shut down due to slit accumulation in the penstock even after a moderate rainfall in the catchment area.</li> </ol> <p>The same has been incorporated in revised MR.</p>	<p>During the current verification period (15 March 2010 to 31 March 2011) the project activity has supplied 18.98 GWh of net electricity (before applying the correction factor due to delay in calibrations) to the integrated NEWNE regional grid of India in comparison to 30.83 GWh of net electricity estimated in the revised PDD approved on 17 February 2012 /5/ (for 382 days), the variation is deemed to be within a reasonable range considering outages of 5289 hours and 35 minutes for Unit-I and 2769 hours and 20 minutes for Unit-II /24/. It has been confirmed by DNV that the maximum output capacity has not been exceeded on any given month during the monitoring period (15 March 2010 to 31 March 2011).</p> <p>The variation in net electricity supplied to the integrated NEWNE regional grid of India figures has resulted in corresponding reduction of emission reduction achieved by the project activity in comparison to the estimates provided in the revised PDD approved on 17 February 2012 /5/. The emissions reductions reported in this monitoring period are 15 359 tonnes of CO<sub>2</sub> equivalents in the period from 15 March 2010 to 31 March 2011 (i.e. 382 days). The yearly expected emission reductions in the approved revised PDD are 23 880 tonnes of CO<sub>2</sub> equivalents, which corresponds to the emission reductions of 24 992 tCO<sub>2</sub>e in 382 days, and hence the reported emission reductions 15 359 tCO<sub>2</sub>e are 38.55% lower than the expected.</p> <p>OK Accepted. CL 1 is closed.</p>

CL ID	Clarification request	Response by Project Participants	DNV's assessment of response by Project Participants
CL 2	PP is requested to clarify the difference in the date of replacement of the energy meters (period of meter usage) in the MR against that recorded in the Sealing Certificate dated 1 September 2010 issued by UPCL.	The installed energy meters are under the control of Uttarakhand Power Corporation Limited (UPCL) with limited asses to PP. The period of usages of these meters during the reported period are clearly mentioned under Table 1 of revised MR.	The date of replacement of energy meter by Uttarakhand Power Corporation Limited (UPCL) is corrected now in revised MR version 02 dated 23 April 2012 /1/. Revised MR version 02 dated 23 April 2012 has been reviewed by DNV /1/.  OK Accepted. CL 2 is closed.

### Forward action requests from previous verification

FAR ID	Forward action request	Summary of how FAR has been addressed in this reporting period	Assessment of how FAR has been addressed
FAR 1	Not Applicable		

### Forward action requests from this verification

FAR ID	Forward action request	Response by Project Participants	DNV's assessment of response by Project Participants
FAR 1	Not Applicable		



## **APPENDIX B**

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### **CURRICULA VITAE OF THE VERIFICATION TEAM MEMBERS**

## ***Gaurav Srivastava***

CDM Validator/Verifier, DNV Bangalore, India holds a Master's Degree in Energy Systems. His educational qualification covers the fields of sustainable development, power plant technology, renewable energy technology, performance of thermal & electrical utilities and project financing. He has completed ISO 14001:2004 - Environmental Management System Auditor / Lead Auditor Program, certified by IRCA.

He has experience of more than 4 years in validation and verification of numerous CDM projects in DNV, both in India & abroad. His qualification, training and experience in CDM demonstrate his sufficient sectoral competence in energy generation from renewable energy sources.

## ***Anand Shrikant Kulkarni***

Anand holds a Bachelor's Degree in Civil Engineering and Master's Degree in Environmental Engineering. He has also done a short term diploma course in Industrial Safety. Anand is having an overall experience of around 15 years. Prior to joining DNV having 10 years' experience in engineering consulting industry covering environmental impact assessment of process industries, infrastructure engineering projects including ports, highways, thermal and hydro power projects. He has worked on review of Detailed Project Reports and Environment Impact Assessment of Small Hydroelectric Power Plants. Anand is also a qualified Lead Auditor and Lead Trainer for ISO 9001, ISO 14001, OHSAS 18001 and management system standards, and has carried out many trainings and audits for over 500 man-days. He is also a qualified Assessor for ISO 28000 and Corporate Responsibility Assessment.

## ***Chandrashekara Kumaraswamy***

Kumaraswamy Chandrashekara holds a Bachelor's Degree in Chemical Engineering and has an overall experience of around 24 years. Prior to joining DNV, has worked for 11 years in the Chemical Process Industry covering Plant Operations, Technical Services and Process Design activities, primarily in the fertilisers and chemicals manufacturing sector. During this tenure of 11 years in the industry, responsibilities included production, process optimization, energy efficiency improvements, environmental performance, process design, energy auditing and technical auditing.

He has experience of around six years in the validation and verification of numerous CDM projects both in India and abroad. His qualification, industrial experience and experience in CDM sufficiently demonstrate his sectoral competence in the areas of chemical process industries, energy generation from renewable sources and waste handling & disposal.

## ***Wan Hasliza SM Jamaluddin***

Wan Hasliza SM Jamaluddin holds a Bachelor's Degree in Chemical Engineering. Having an overall experience of around eleven years. Prior to joining DNV having four years in the field of project management for natural gas pipeline construction and four years on the implementation of Montreal Protocol for Malaysia. Her experience covers the fields of

construction and environmental management. She has experience of around four years in validation and verification of CDM projects in DNV in South East Asia region.

Her qualification, industrial experience and experience in CDM demonstrate her sufficient sectoral competence in "Waste Handling and Disposal" and "Energy Generation from Renewable Energy Sources".