VCS Verification Report

VERIFICATION REPORT OF THE 65MW DAGUSHAN HYDROPOWER PROJECT IN CHINA

Verified Carbon Standard Version 2007.1

Report No: VCS 023, rev. 02

Germanischer Lloyd Certification GmbH • Brooktorkai 18 • 20457 Hamburg • Germany
Handelsregister Hamburg, Abt. B., Nr. 52078

Date of first issue: 2011-06-30	Project No.: VCS 023
Approved by: Markus Weber	Organizational unit: Greenhouse Gas Services
Client: Gansu Zhangye Dagushan Hydropower Co., Ltd.	Client ref. Mr. Jianjun Ding

Summary:

Germanischer Lloyd Certification GmbH (GLC) has performed the pre-CDM VCS verification of the project: "65MW Dagushan Hydropower Project in China", with regard to the relevant requirements for VCS 2007.1. By generating renewable grid connected electricity, the project reduces GHG emissions due to displacement of equivalent electricity that would otherwise have been generated by existing fossil fuel based grid-connected power plants and by the addition of new generating sources.

The project activity has already been validated by TÜV Nord and registered as a CDM project on 9th May 2010. Following requirements of VCS 2007.1, the VCS crediting period covers from 2009-07-22 to 2010-05-08 (including both days). GLC conducted the additional validation/10/of clauses 1.12, 1.13, 1.14, 8.1 and 8.2 set out in the VCS Project Description for project validation under VCS 2007.1.
The starting date of the crediting period of the project activity is 2009-07-22. The emission reductions are claimed as Verified Carbon Units (VCU) under the Verified Carbon Standard 2007.1 (VCS2007.1).

In GLC's opinion, the GHG emission reductions for the 65MW Dagushan Hydropower Project in China as reported in the Monitoring Report Version 02 dated 2011-06-07 are calculated without material misstatements in a conservative and appropriate manner. The GHG emission reductions were correctly calculated on the basis of the approved UNFCCC CDM monitoring methodology ACM0002 version 10, and relevant methodology tools, applicable VCS requirements and the monitoring plan contained in the validated CDM PDD for the project activity. Germanischer Lloyd Certification GmbH herewith confirms that the project has achieved emission reductions in the above mentioned reporting period as follows:

Emission reductions (2009-07-22 to 2009-12-31)	139,394	t CO_{2e}
Emission reductions (2010-01-01 to 2010-05-08)	32,621	t CO_{2e}
Emission reductions in total	172,015	t CO_{2e}

GLC does not assume any responsibility towards the issuance and utilization of VCUs hereby verified and certified. Request for issuance of VCUs shall be made by the project proponent to an approved VCS Program Registry based on the requirements set out under the most recent version of the VCS Program Guidelines clause on VCS Registration. The verification of reported emission reductions is based on the information made available to GLC and the engagement conditions detailed in this report. Hence, GLC cannot be held liable by any party for decisions made or not made based on this report.

Report No.: VCS 023	Subject Group: VCS	Indexing terms
Report title:		

Verification Report of the 65MW Dagushan Hydropower Project in China			
Work carried out by: Ruifeng, Li Jian, Shi			☒ No distribution without permission from the Client or responsible organizational unit
Work verified by: Hang, Zhou			☐ Limited distribution
Date of this revision: 2011-07-10	Rev. No.: 02	Number of pages: 32	☐ Unrestricted distribution

Abbreviations

CA	Corrective Action / Clarification Action
CAR	Corrective Action Request
NWPG	Northwest China Power Grid
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CL	Clarification Request
CO_2	Carbon dioxide
CO_2eq	Carbon dioxide equivalent
CR	Clarification Request
DOE	Designated Operational Entity
EF	Emission Factor
EG_y	Electricity Generation in year y
ER	Emission Reduction
ETN	Electricity Transaction Notes
FAR	Forward Action Request
GHG	Greenhouse gas(es)
MP	Monitoring Plan
MR	Monitoring Report
PDD	Project Design Document
PP	Project Participant
QA/QC	Quality Assurance / Quality Control
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Verified Carbon Standard
VCSA	VCS Association
VCS 2007.1	Verified Carbon Standard - Version 2007.1
VCS PD	VCS Project Description
XLS	Emission Reduction Calculation Spread Sheet

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1. INTRODUCTION

Gansu Zhangye Dagushan Hydropower Co., Ltd. has commissioned the Germanischer Lloyd Certification GmbH (GLC) to carry out the pre-CDM VCS verification of the emission reductions reported for the VCS project activity "65MW Dagushan Hydropower Project in China" with regard to the relevant requirements for VCS program as per the Verified Carbon Standard 2007.1 (VCS 2007.1).

This verification report summarizes:

(i) The findings from the VCS verification; and

(ii) VCU certification statement for the emission reductions.

1.1. Objective

VCS Verification is the periodic independent review and ex post determination by a Verification Entity or Designated Operational Entity (DOE) (which is approved/registered as a verifier by VCSA) of the monitored reductions in GHG emissions that have occurred as a result of the registered CDM project activity during a defined verification period.

VCS Certification is the written assurance by a Certification Entity (which is approved/ registered as a certifier by VCSA) 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 "65MW Dagushan Hydropower Project in China" for the monitoring period covering 2009-07-22 to 2010-05-08.

1.2. Scope and Criteria

1.2.1. Scope of the verification

The scope of the verification is:

- To ensure that the project activity has been implemented and operated as per the latest version of the VCS PD (in this case, CDM PDD) and that all physical features (technology, project equipment, and monitoring and metering equipment) of the project are in place.
- To verify that actual monitoring systems and procedures are in compliance with the monitoring systems and procedures described in the monitoring plan as per the latest version of the VCS PD (in this case, CDM PDD).
- 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 the 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.

According to VCS 2007.1 dated 2008-11-18 and a Policy Announcement of Further Guidance for Projects that are registered in Two GHG Programs issued by the VCS Association on 2008-03-19, the Project registered under CDM program is eligible to claim Voluntary Carbon Units (VCUs) generated prior to the registration date under CDM program. Based on this announcement, GLC has conducted additional validation /10/ that covers validation of clauses 1.12, 1.13, 1.14, 8.1 and 8.2 set out in the VCS Project Description template, which as an

addendum to the CDM validation report by TÜV Nord /9/ of the Project for completion of VCS validation. Hence, the project design, its eligibility as project activity under VCS 2007.1 and the correct application of the approved CDM baseline and monitoring methodology ACM0002 version 10 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" /13/ have all been validated. As stated in the VCS additional Validation Report for the "65MW Dagushan Hydropower Project in China" the validation opinion of GLC is that the "65MW Dagushan Hydropower Project in China" as described in the CDM PDD/2/ and VCS PD of 2011-03-21 /6/ meets all VCS Program requirements as set out in the VCSA Rules.

1.2.2. Verification Criteria

The verification team has focused on the identification of significant reporting risks and verifying the mitigation measures for these risks based on the recommendations in the "Validation and Verification Manual" /1/, "ISEA3000 (Revised) Assurance Engagements other than Audits or Reviews of Historical Financial Information" /8/ and/or "ISO/FDIS 14064-3 "Greenhouse gases – Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions and employed a risk-based approach" /7/.

According to the requirements and guidance of VCS 2007.1, the criteria of this verification include the relevant applicable rules and steps for CER verification under the CDM excluding the following:

- The public availability of the VER/VCS Monitoring Report;
- Confirmation of contribution of the project activity towards sustainable development in the country where the project is located
- The public availability of the Verification Report and VCU Certification Statement.

1.3. VCS Project Description: "65MW Dagushan Hydropower Project in China"

1.3.1. Project Characteristics

Table 1: Project Characteristics

Item	Data
Title of the project activity	65MW Dagushan Hydropower Project in China
Project Location (specific Address, Country)	Heihe River, Su'nan Yugu Autonomous County, Gansu Province, P.R. China. The exact location is 100°01' 29" E, 38°37' 21" N.
Project proponent	Gansu Zhangye Dagushan Hydropower Co., Ltd.
Project Entity	Gansu Zhangye Dagushan Hydropower Co., Ltd. Heihe Hydropower Office Building, the Cross in Qingnian Eastern Street , Zhangye City, Gansu Province, P. R. China Represented by Mr. Jianjun Ding
Applied Methodology	CDM Methodology ACM0002, version10

Sectoral Scope	(01) Energy industries (renewable - / non-renewable sources)
Project crediting period	2009-07-22 to 2010-05-08
Period verified in this verification	2009-07-22 to 2010-05-08

1.3.2. Project Background

The Project is a run-of-river type hydroelectric plant located in the Su'nan Autonomous County and about 102KM far from Zhangye City in Gansu Province. The installed capacity is 65MW served by 3 turbines and 3 generators. The expected annual net power generation of project is 195,150MWh and the annual operation time is estimated to be 3,094 hours. The main constructions of the project including: dam, division tunnel, pressure tunnel, power house and transfer substation.
The project will export renewable hydropower to the Northwest China Power Grid (NWPG), replacing electricity from fossil fuel based power plants connected to the NWPG, therefore reducing greenhouse gas emissions.
The key parameters for the project are given in table 2:

Table 2: Technical data of the plant

Parameter	Unit	Value	
Turbines			
Type	-	HL257-LJ-225	HL 257-LJ-160
Quantity	-	2	1
Rated Rotation Speed	r/min	300	428.6
Rated Water Head	m	73	73
Generators			
Type	-	SF-J26-20/4800	SFJ13-14/3400
Quantity	-	2	1
Rated Capacity	MW	26	13

1.3.3. Level of Assurance

As the VCS only recognizes verified emission reductions, GLC has focused on providing a reasonable level of assurance that the emission reduction calculation methodology used is appropriate and correctly applied, and that emission reductions have been accurately monitored.

In accordance with the recommendation in the Validation and Verification Manual /1/, GLC may "discount verified emission reductions or requests a discount of these by using conservative assumptions for uncertainties in emission reduction calculations that cannot be fully quantified or that cannot give a desired level of assurance". For verifying/certifying VCUs, the desired level of assurance was based on the combined quantitative assessment of the accuracy of monitoring project performance and the identification of material risks.

2. METHODOLOGY

2.1. Verification Process Summary

The verification process is based on the guidelines described in the Validation and Verification Manual /1/. In addition to that standard auditing techniques have been applied. The verification team performs first a desk review, followed by an on-site visit to review the project realization.

The verification process is based on assessment of the validated CDM Project Description document /2/ and VCS PD /6/, the monitoring report /3/, emission reduction calculation spreadsheet /4/, 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 verification is carried out on the basis of the following requirements, applicable for this project activity:

- requirements and guidance of VCS 2007.1
- applicable CDM guidelines and requirements, including applicable relevant methodological decisions made by the CDM Executive Board.
- other relevant rules, including the host country legislation,
- CDM Validation and Verification Manual /1/,
- Revised and approved monitoring plan as given in the monitoring report /3/,
- Approved CDM Methodology ACM0002 ver.10 /13/

2.2. Verification Team

A competent team with relevant knowledge and experience in the specific scopes and sectors is appointed.

The verification team consists of the following members:

Table 3: Verification Team

	Name	Location	Function[1)]	Scope Specific Knowledge	Sector Specific Knowledge	Host Country Knowledge
☒ Mr. ☐ Ms.	Ruifeng, Li	Beijing, China	ATL	Y	Y	Y
☐ Mr. ☒ Ms.	Jian, Shi	Beijing, China	A	Y	Y	Y
☒ Mr. ☐ Ms.	Hang, Zhou	Shanghai, China	TR	Y	Y	Y

1) ATL: Assessment Team Leader; A: Auditor, TR: Technical Reviewer.

Duration of the verification

Preparations:	2010-06-01 to 2010-06-20
On-site verification:	2010-06-25
Reporting/QA:	2011-06-20 to 2011-07-10

2.3. Review of Documentation

During the desk review all documents initially provided by the client and publicly available documents relevant for the verification were reviewed. The main documents are listed below:

- The validated CDM PDD and VCS PD, including the monitoring plan and the corresponding validation reports:
- The applied monitoring methodology;
- Requirements and guidance of VCS 2007.1 as well as applicable methodological relevant decisions, clarifications and guidance from the CDM Executive Board;
- Any other information and references relevant to the project activity's resulting emission reductions (e.g., IPCC reports, data on electricity generation in the national grid or laboratory analysis and national regulations).

2.4. On-site assessment

On 2010-06-25 and 2010-06-26, GLC carried out an on-site visit to "65MW Dagushan Hydropower Project in China" located at Heihe River, Su'nan Yugu Autonomous County, Gansu Province, P.R. China. During the visit, GLC verified that the actual implementation of the project was as described in the CDM PDD and the revised and approved monitoring plan.

The on-site inspection included review of data and records, interviews with assistant plant manager, operations and maintenance personnel, confirming all data sources and constants used in the Monitoring Report.

The main tasks covered during the on-site visit included, but were not limited to:

- Checking that all project equipments have been installed and operated as per the CDM PDD.
- The operating staff was interviewed and observed in order to check the risks of inappropriate operation and data collection procedures.
- Information processes for generating, aggregating and reporting the selected monitored parameters were reviewed.
- Calibration records of all metering equipment were checked.
- Auditing of the monitoring processes, routines and documentations were audited.
- The monitored data was checked completely.
- The data aggregation trails were checked via spot sample down to the level of the meter recordings.

The on-site audit was carried out on 2010-06-25.

Representatives of Gansu Zhangye Dagushan Hydropower Co., Ltd. (project owner) including the operational staff of the plant were interviewed to confirm selected information and to resolve issues identified in the document review.
The main topics of the interviews are summarized in Table 4.

Table 4: Interviewed persons and main topics

Interview Topic	Interviewed persons and source of information
- General aspects of the project - Technical equipment and operation - Changes since validation - Monitoring and measurement equipment - Remaining issues from validation - Calibration procedures - Quality management system - Involved personnel and responsibilities - Training and practice of the operational personnel - Implementation of the monitoring plan - Monitoring data management - Data uncertainty and residual risks - GHG calculation - Procedural aspects of the verification - Maintenance - Environmental aspects	1. Mr. Mengde Liu, Gansu Zhangye Dagushan Hydropower Co.,Ltd. 2. Mr. Daixue Min, Gansu Zhangye Dagushan Hydropower Co., Ltd. 3. Mrs.Xuan Zhou, Gansu Zhangye Dagushan Hydropower Co.,Ltd.

2.5. Reporting of Findings and Resolution of Outstanding Issues

On the basis of the desk review, the on-site visit, follow-up interviews and further background investigation the verification report is completed.

Findings established during the verification may be that:

i) the verification is not able to obtain sufficient evidence for the reported emission reductions or part of the reported emission reductions. In this case these emission reductions shall not be verified and certified;
ii) the verification has identified material misstatements in the reported emission reductions.

A detailed list of verification findings form the draft verification report, which is sent to the client for resolution of raised CARs, CLs and FARs.

Nonconformities raised during the verification can either be seen as a non-fulfillment of criteria ensuring the proper implementation of a project or where a risk to deliver high quality emission reductions is identified.

Corrective Action Requests (CARs) are issued, if:

- the project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions;
- the CDM requirements have not been met;
- there is a risk that emission reductions cannot be monitored or calculated.

Forward Action Requests (FAR) indicate essential risks for further periodic verifications. Forward Action Requests are issued, if:

- the actual status requires a special focus on this item for the next consecutive verification, or an adjustment of the monitoring plan is recommended.

The verification team uses the term Clarification Request (CL), which is issued if:

- if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

For a detailed list of all CARs, CLs and FARs raised in the course of the verification please refer to chapter 3.

2.6. Technical Review

Before submission of the final report a technical review of the verification report is carried out. The technical reviewer is a competent GHG auditor appointed for the scope the project activity falls under.

As a result of the internal review process the verification opinion and the topic specific assessments as prepared by the verification team leader may be confirmed or revised. Furthermore reporting improvements might be achieved.

3. VERIFICATION FINDINGS

3.1. Remaining issues, FARs from previous validation or verification

The verification teams identified no missing steps, open issues or material discrepancy raised in the CDM validation report. Also, this is the first and only verification for pre-CDM VCS crediting period. There were no pending issues from any previous validation or verification.

3.2. Project implementation in accordance with the previously validated VCS PD

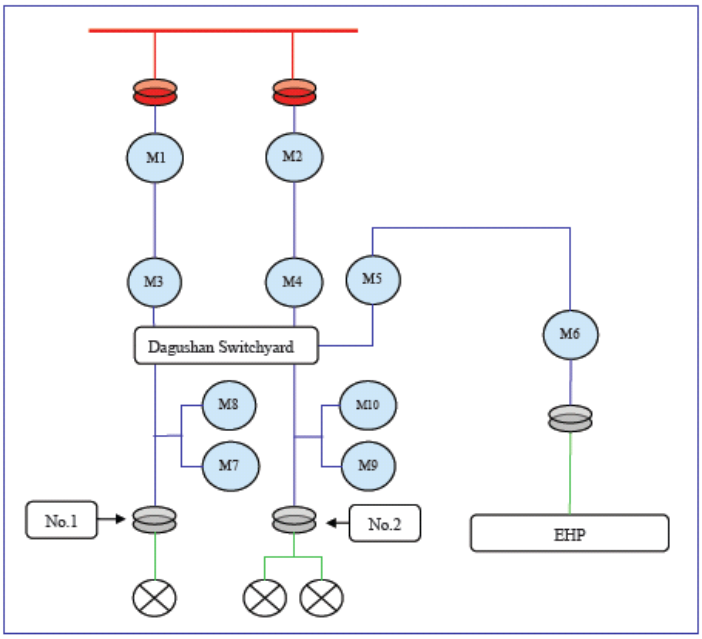
PP is requested to provide VCS Monitoring Report as per VCS 2007 version 01 to DOE in CAR 1. It is closed out upon receive the required document.

It is found many inconsistencies (e.g. accuracy & location of metering equipments, formulae of net electricity calculation) of monitoring report against description in registered PDD during on-site visit; hence, the revision of monitoring plan is requested in CAR 5.

The monitoring plan has been revised and approved by EB on 2011-03-03 (http://cdm.unfccc.int/Projects/DB/RWTUV1256040897.46/view), the monitoring report version 02 /6/ was prepared as per the revised monitoring plan.

The Project generates electricity from renewable sources. The total installed capacity of the 3 generators amount to 65 MW. The project is fully implemented and operating.

The power generated by the Project will be transmitted to Heihe Substation (330kV) together with the electricity of Erlongshan Hydropower Plant (hereinafter “EHP”, a CDM project, located in the upper reaches of the proposed project), and then to Gansu Power Grid and finally to NWPG. The diagram of grid connection is illustrated as follows:



Ten meters are involved and to be monitored for the calculation of EG_y, which is net electricity, measured in MWh, produced by the Project and supplied to the Northwest China Power Grid (NWPG) in year y. The equation is as per the revised and approved monitoring plan revision and in accordance with the calculation approach stipulated in the Power Purchase Agreement /20/ signed between the project owner and the grid company.

$$EG_y = [(M1 + M2)] \times \left[\frac{(M7 + M9)}{(M5 + M7 + M9)} \right]$$

Note: M3, M4, M6, M8 and M10 are backup meters.

According to the revised and approved monitoring plan in the monitoring report, the data of electricity generation are verified against electricity sale invoices. The automatic monitoring system which monitors all the meters will collect the data every 15 minutes and at 24:00 o'clock of the day at the end of each month, it will collect the readings on M1, M2, M7, M9 and M5. The collected data will be delivered to Gansu Provincial Power Trading Centre (hereunder abbreviated as GPPTC) and local grid company. Then the ETNs will be issued to the project owner, and finally the project owner will issue electricity sale invoices to the grid company.

As part of the verification GLC has also assessed that all eligibility criteria of the project under VCS 2007.1(previously assessed by DOE TÜV Nord under CDM and VCS additional validation report by GLC) are still valid along the monitoring period from 2009-07-22 to 2010-05-08:

- According to VCS 2007.1 dated 2008-11-18 and a Policy Announcement of Further Guidance for Projects that are registered in Two GHG Programs issued by the VCS Association on 2008-03-19, the Project registered under CDM program is eligible to claim Voluntary Carbon Units (VCUs) generated prior to the registration date under CDM program. The starting date of electricity generation for the Project is defined as 2009-07-22 in Project Description (PD), which is earlier than the starting date of crediting period of the Project under CDM on 2010-05-09. Thus, the crediting period of the Project from

2009-07-22 to 2010-05-08 is eligible to claim the VCUs which is in compliance with the Policy Announcement from the VCS Association.

- CDM is a GHG Program approved by the VCS Board and currently there are no time or geography limitations in the application of the CDM baseline and monitoring methodology CDM methodology ACM0002, ver.10.
- The project has not been presented nor rejected to/by any other GHG program.

3.2.1. Eligible GHGs

Emission sources and gases included in the project boundary are:

Table 5: Emission sources and gases

	GHGs involved	*Description*
Baseline emissions	*CO_2*	*CO_2 emissions from electricity generation by fossil fuels power plants connected to the national grid that is displaced due to the Project Activity.*
Project emissions (Emissions due to the destruction process)	-	*The Project is a hydropower project, and the power density is greater than 10W/m². According to the applied methodology ACM0002, ver.10 project emissions can be regarded as zero.*
Leakage	-	*The generating equipment of this project has not been transferred from another project. Therefore and in accordance with the applied methodology ACM0002, ver.10 leakage emissions can be regarded as zero.*

3.2.2. Project Starting Date and Emission Reduction Start Date

According to the VCS Program the project start date is the date the project activity began reducing or removing GHG emissions.

The project start date was 2009-07-22.

3.2.3. Public Funds and Grants

The validation of the project under VCS did not reveal any information that indicated that the project received any public funding.

3.2.4. Project Boundary / GHG Assessment Boundary

The project boundary is clearly defined as the site of the project activity "65MW Dagushan Hydropower Project in China" and the system boundary is defined the Northwest China Power Grid, as all power plants are connected physically to the NWPG. Please refer to the description and assessment in CDM validation report. For emission sources and gases included in the project boundary, see Section 3.2.1.

3.2.5. Baseline Determination

While the baseline determination for the project activity was previously assessed by DOE TÜV Nord as part of the validation of the project under CDM, it is confirmed that:

i) The project correctly applies the approved baseline and monitoring methodology baseline and monitoring methodology ACM0002, ver.10.

ii) The baseline and monitoring methodology has been correctly applied and the assumptions made for the selected baseline scenario are sound.

The baseline scenario is correctly defined as that the amount of electricity delivered from the project activity to the grid otherwise would have been generated by fossil fuels grid-connected power plants and by the addition of new generation sources. This is reflected in the combined margin (CM) - the weighted average of the operating Margin (OM) emission factor and the build margin (BM) emission factor.

Baseline emissions are equal to the product of the *ex-ante* determined grid emission factor times the electricity supplied by the project activity to the grid. The baseline emission factor (EF_y) of the project activity is based on an ex-ante calculation using the Combined Margin approach. EF_y is the emission factor of the NWPG, which is an equally weighted average of the operating margin emission factor (OM) and the build margin emission factor (BM). EF_y is calculated as 0.8712 tCO_2e/MWh. The emission factor remains fixed throughout the crediting period.

Detailed information regarding baseline determination for project activity is available at:

iii) CDM PDD /2/ ;
iv) CDM Validation report /9/.

3.2.6. Project Additionality

As the project design document was previously assessed by the DOE TÜV Nord as part of the validation of the project under CDM, in terms of the project's baseline and additionality, it is thus confirmed that the project is not a likely baseline scenario and that emission reductions resulting from the project are additional.

Detailed information regarding project additionality is available at:

v) CDM PDD /2/ ;
vi) Validation report /9/.

3.2.7. GHG Emission

As the project design document was previously assessed by the DOE TÜV Nord as part of the validation of the project under CDM, it is thus confirmed that the approach for determining project and baseline emissions are appropriate and in accordance with the selected baseline and monitoring methodologies.

The grid emission factor is calculated ex-ante and defined as 0.8712 t CO_2e/MWh. It remains fixed throughout the crediting period.

3.2.8. Secondary Effects

As project environmental impacts were previously assessed by the DOE TÜV Nord as part of the project validation, GLC understands that the project's social and environmental impacts have been sufficiently addressed.

3.2.9. Impacts on Sustainable Development

As project environmental impacts were previously assessed by the DOE TÜV Nord as part of the project validation, it is GLC's understanding that the project's social and environmental impacts have been sufficiently addressed.

3.3. Completeness of monitoring

As the project design was previously assessed by the DOE TÜV Nord as part of the project validation, it is GLC's contention that the application of the monitoring methodology is transparent.

The latest version of the submitted monitoring report which forms the basis of the verification was prepared by summarizing consolidated data over the whole monitoring period as required by the revised and approved monitoring plan by EB. All indicators stated in the validated monitoring plan based on the UNFCCC CDM monitoring methodology ACM0002*,* ver.10, are monitored and reported. According to the applied methodology the monitoring consists of "*metering the electricity generated by the renewable technology".*

The calculation of emission reductions in the monitoring report shall be based on the calculated net electricity generated by the Project measured by electricity meters as main data source. Recording of meters value is done jointly by the project owner and the grid company. The calculated electricity values as per Power Purchase Agreement are provided by the grid company to the project owner in Electricity Transaction Notes (ETN) /18/, which works as the basis for issuance of sales invoices after project owner's confirmation. Then, the electricity sales invoices /19/ are issued by the project owner to the buyer grid company. Therefore the ETN serves as basis for emission reduction calculation.

The aggregated monthly data for meters are recorded in a monthly summary log book/12/, which can serve as cross check for invoicing. The verification team has checked the aggregated monthly data, by applying the same calculation approach, the result is the same as that on ETNs.
The monitoring procedures are in accordance with the methodology and are implemented.

The monitoring indicator EG_y has been monitored with calibrated energy meters as described in the revised and approved monitoring plan on monitoring report /3/. The data in the monitoring report have been verified by the monthly summaries and the Emission Transaction Notes/18/ which are sent by the grid company for invoicing. Moreover the figures have been cross checked with the sales invoices finally issued.

The monitoring mechanism is effective and reliable.

The monitoring plan requires the monitoring of the following data:

Table 6: Data to be monitored

<table>
<tr><th></th><th>Assessment/ Observation</th></tr>
<tr><td>Data / Parameter:
(as in monitoring plan of the VCS PD):</td><td>Net electricity supplied to the grid by the Project in year y ($EG_{y)}$</td></tr>
<tr><td>Measuring frequency:</td><td>Continuously</td></tr>
<tr><td>Reporting frequency:</td><td>Monthly</td></tr>
<tr><td>Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)</td><td>Yes.
Monthly official Electricity Transaction Notes are issued by the grid company officers and confirmed by the project proponent. The ETN serves as basis for the electricity sales invoices. The calculation of emission reductions is correctly based on the net electricity fed to the grid.
As a conclusion monthly values of net electricity exports based on measurements conducted by the distribution company has been taken as basis for the emission calculations.</td></tr>
<tr><td>Type of monitoring equipment:</td><td>Ten meters are involved and to be monitored for the calculation of EG_y. The meters are read on the 24:00 of the last day of every month. The calculation of
$$EG_y = [(M1+M2)] \times \left[\frac{(M7+M9)}{(M5+M7+M9)}\right]$$
EG_y is
Details are as follows:
<table><tr><th colspan="2">M1</th></tr><tr><td>Serial Number</td><td>36061122</td></tr><tr><td>Class (S)</td><td>0.2s</td></tr><tr><td>Multiplying factor</td><td>1320</td></tr></table>
<table><tr><th colspan="2">M2</th></tr><tr><td>Serial Number</td><td>36085837</td></tr><tr><td>Class (S)</td><td>0.2s</td></tr><tr><td>Multiplying factor</td><td>1320</td></tr></table>
<table><tr><th colspan="2">M3</th></tr><tr><td>Serial Number</td><td>0850060011</td></tr><tr><td>Class (S)</td><td>0.2s</td></tr><tr><td>Multiplying factor</td><td>1320</td></tr></table>
<table><tr><th colspan="2">M4</th></tr><tr><td>Serial Number</td><td>0850060012</td></tr><tr><td>Class (S)</td><td>0.2s</td></tr><tr><td>Multiplying factor</td><td>1320</td></tr></table></td></tr>
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	<table><tr><td colspan="2">M5</td></tr><tr><td>Serial Number</td><td>53033805</td></tr><tr><td>Class (S)</td><td>0.2s</td></tr><tr><td>Multiplying factor</td><td>440</td></tr></table> <table><tr><td colspan="2">M6</td></tr><tr><td>Serial Number</td><td>934603</td></tr><tr><td>Class (S)</td><td>0.2s</td></tr><tr><td>Multiplying factor</td><td>440</td></tr></table> <table><tr><td colspan="2">M7</td></tr><tr><td>Serial Number</td><td>53033804</td></tr><tr><td>Class (S)</td><td>0.2s</td></tr><tr><td>Multiplying factor</td><td>275</td></tr></table> <table><tr><td colspan="2">M8</td></tr><tr><td>Serial Number</td><td>53033803</td></tr><tr><td>Class (S)</td><td>0.2s</td></tr><tr><td>Multiplying factor</td><td>275</td></tr></table> <table><tr><td colspan="2">M9</td></tr><tr><td>Serial Number</td><td>53033801</td></tr><tr><td>Class (S)</td><td>0.2s</td></tr><tr><td>Multiplying factor</td><td>440</td></tr></table> <table><tr><td colspan="2">M10</td></tr><tr><td>Serial Number</td><td>53033802</td></tr><tr><td>Class (S)</td><td>0.2s</td></tr><tr><td>Multiplying factor</td><td>440</td></tr></table>
Is accuracy of the monitoring equipment as stated in the VCS PD? If the VCS PD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practice?	Accuracy values of the electricity meters are 0.2s as specified in the CDM PDD. The governing performance standard for kilowatt meters is the *Technical Administrative Code of Electric Energy Metering DL/T448-2000* /16/, which requires a meter accuracy of 0.2S to 0.5S for invoice meter measuring electricity supplied by power plant to a provincial grid company. The accuracy of the ten meters represent good monitoring practice.
Calibration frequency /interval:	The national regulation for meter calibration is the *"Verification regulation of electronic electric energy meter" JJG 596-1999* /17/. According to this regulation

the Verification cycle of installation-type electric energy meter in use is normally five years.
The calibration certificates /22/ are as follows:

M1 & M2	
Calibration Date	2009-09-04
	2009-12-03
	2010-03-02
	2010-06-01

M3 & M4	
Calibration Date	2009-07-18
	2010-06-17

M5	
Calibration Date	2009-09-22
	2009-12-20
	2010-03-18
	2010-06-17

M6	
Calibration Date	2009-08-25
	2010-08-24

M7	
Calibration Date	2009-09-22
	2009-12-20
	2010-03-19
	2010-06-17

M8	
Calibration Date	2009-07-20
	2010-06-17

M9	
Calibration Date	2009-09-22
	2009-12-20
	2010-03-18
	2010-06-17

M10	
Calibration Date	2009-07-20
	2010-06-17

Is the calibration interval in line with the monitoring plan of the VCS PD? If the VCS PD does not specify the frequency of calibration, does the selected frequency represent good monitoring practice?	Calibration intervals for the electricity meters are not defined in the CDM PDD but shall be in accordance with national standards. Nevertheless metering equipment is verified regularly according to the above mentioned standards by an authorised authority.
Company performing the calibration:	Electric Energy Measurement Centre of Gansu Electric Power Corporation /11/
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes. The calibration certificates /22/ /confirm proper functioning of monitoring equipments, they are all qualified.
Is (are) calibration(s) valid for the whole reporting period?	Yes. The calibration certificates are valid for the whole reporting period.
If applicable, has the reported data been cross-checked with other available data?	The electricity generation data is provided in the monthly electricity transaction notes issued by the grid company. These data have been cross-checked with the data recorded in the aggregated monthly report as well as the sales invoices issued by the project owner to the grid company.
How were the values in the monitoring report verified?	Please see 3.5 and 3.6
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?	Please see 3.5 and 3.6

The calibrtion certificates for all metering equipments during VCS calatation period are requested in CL1.The calibration reports for all meters that valid from this monitoring period have been submitted and the accreditation certificate for calibration entity is also checked as valid. CL 1 is thus closed out.

	Assessment/ Observation
Data / Parameter: (as in monitoring plan of the VCS PD):	A_{PJ}
Monitoring frequency:	Yearly
Reporting frequency:	Yearly
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes. It is in accordance with the monitoring methodology ACM 0002 Version 10.
Type of monitoring equipment:	Reservoir map compiled by applying CASS professional software and Gpt-3002Ln instrument.
Company performing the calibration:	Gansu Province Hydraulic Electricity Survey and

	Design Institute, First Branch
Did calibration confirm proper functioning of monitoring parameter? (Yes / No):	Yes. The A_{PJ} Measurement Result Report /5/ stated the area of the reservoir measured in the surface of the water after the implementation of the project activity, when the reservoir is full is 138,047m^2.
Is (are) calibration(s) valid for the whole reporting period?	Yes. The A_{PJ} Measurement Result Report is issued on 2011-04-25, which is valid for the whole reporting period.

3.4. Accuracy of GHG emission reduction calculations

The monitoring period is described as from 2009-07-22 to 2010-05-08 in the monitoring report.

However, the start date in Emission Reduction Sheet is from 1st July 2009, it is requested to revise it to actual start date 22nd July 2009, and provide relevant evidence for electricity generated in CAR 2. The revision has been made and it is clearly indicated on the ETN for July 2009 that the commission date for the Project is 22nd July 2009. CAR 2 is thus closed out.

The electricity data from 1st May 2010 to 8th May 2010 are requested to be included in Emission Reduction Sheet in CAR 3. As PP voluntarily disclaims the emission reduction generated from 1st May 2010 to 8th May 2010, the mentioned emission reduction is not included. This is considered as conservative. CAR 3 is thus closed out

The electricity data for December 2009 and April 2010 in Emission Reduction Sheet are not consistent with their invoice value, it is requested to make revisions and provide the updated Emission Reduction Sheet to DOE in CAR 4. PP explains the inconsistency is due to default power generation, however, as stipulated in Power Purchase Agreement, the default power generation will not be settled by the grid company. In addition, from conservative perspective, the value on invoice should be used. After checking the revised emission reduction sheet, CAR 4 is closed out.

During on-site inspection, it is found many inconsistencies (e.g. accuracy & location of metering equipments, formulae of net electricity calculation) of monitoring report against description in registered PDD; hence, the revision of monitoring plan is requested in CAR 5. The revised monitoring plan has been approved by EB on 3rd March 2011 and correctly applied in the monitoring report. CAR 5 is thus closed out.

GHG emissions reductions for the project and the baseline scenario were correctly calculated. For emission reduction calculation the net electricity exported by the project to the CCPG is multiplied with the validated grid emission factor of the Northwest China Power Grid (NWPG) 0.8712 t CO_2e/MWh. The emission factor is calculated ex-ante by using the Combined Margin Approach, according to the baseline methodology ACM 0002 ver.10.

Electricity exports data records were found to be of adequate quality. The verification team has cross-checked the monthly electricity transaction notes with the aggregated monthly report and the electricity sales invoices finally issued.

The emission reduction being claimed during the period 2009-07-22 to 2010-05-08 is higher than the estimated emission reductions in the registered CDM PDD.

Table 7: Emission Reductions

Period	As per CDM PDD (t CO_{2e})	Monitoring report (t CO_{2e})
Emission Reductions	135,080 (290days) Calculated as : (170,015 /365*290days)	172,015 (290days)
% Deviation (+/-)	0	(+) 27%

3.5. Quality of evidence to determine emission reductions

The power plant has an aggregated monthly report where the data of all meters that for EG_y calculation are available. The amount of total electricity generation, electricity consumed by the project and the net electricity supplied to the grid is monitored.
Several documents were submitted by the project proponent as evidence to determine emission reductions.
The net electricity generated was cross-checked with aggregated monthly report and the energy measurements observed at the outgoing points are found matching after deducting electricity imports and the normally observed transmission losses.
The training records for station staff are requested in CL2. The training records /23/are provided later, including test paper for on-site operation by staff and the staff qualification certificate for dispatching, approved by local provincial electricity centre. Together based on the on-site inspection and observation, the staffs are qualified for daily operation for the proposed project.

Furthermore competent employees are recruited, who are found knowledgeable and trained not only about the plant operations but also ensuring the quality of data and recording and maintaining. The plant operation and management regulations /24/are also observed on-site.
The verification team concludes that the evidence and the data are provided for the reported results and that the reported emissions are accurate.

Section 3.3 includes detailed description of procedures for data collection and reporting, QA/QC, calibration and other aspects related to quality of monitoring procedures used for determining the emission reductions for the monitoring period of monitoring period from 2009-07-22 to 2010-05-08. For *ex-ante* selected parameters, see the CDM PDD/2/ and additional VCS Validation Report for the "65MW Dagushan Hydropower Project in China" /9/.

3.6. Management and quality assurance

GLC was able to verify that authorities and responsibilities for monitoring and reporting of all data related to the emission reductions were clearly defined for the monitoring period from 2009-07-22 to 2010-05-08. Moreover, all project related equipments were confirmed to be operated by qualified and trained staff. The frequency of

monitoring measurement, as well as applicable calibrations and reporting details were conducted as outlined in the revised monitoring plan available in the monitoring report[3].

3.7. Project Scorecard

Risk Areas		Conclusions: Baseline Emissions	Conclusions: Project Emissions	Conclusions: Calculated Emission Reductions	Summary of findings and comments	Error/Discounted Uncertainty Tons
Completeness	• Source coverage/ boundary definition	Good	-	Good	The source coverage was complete as per the registered CDM PDD and validation report.	No error was found
Accuracy	• Physical Measurement and Analysis	Good	-	Good	The physical measurement / recording of data were found to be accurate.	No error was found
	• Data calculations	Good	-	Good	Formulae and calculation of VCUs and relevant data were found to be accurate.	No error was found
	• Data management & reporting	Good	-	Good	The relevant GHG data was achieved and readily retrievable.	No error was found
Consistency	• Changes in the project	Good	-	Good	The monitoring plan has been revised and approved by EB.	No error was found

4. VERIFICATION STATEMENT

Germanischer Lloyd Certification GmbH (GLC) has performed the pre-CDM VCS verification of the project: "65MW Dagushan Hydropower Project in China", with regard to the applicable relevant requirements for VCS project activity. The project reduces GHG emissions due to electricity production from hydropower using the water flows of the Heihe River, Su'nan Yugu Autonomous County, Gansu Province, China. This verification covers the period from 2009-07-22 to 2010-05-08 (including both days).

Gansu Zhangye Dagushan Hydropower Co., Ltd. is responsible for the collection of data in accordance with the validated monitoring plan and the reporting of GHG emissions reductions from the project.

It is GLC's responsibility to express an independent verification statement on the reported GHG emission reductions from the project. GLC does not express any opinion on the selected baseline scenario or on the validated and registered CDM PDD.

GLC conducted the verification on the basis of the monitoring methodology ACM0002, ver.10, the revised and approved monitoring plan of the project and the monitoring report of 2011-06-07, ver.2.0.

GLC'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. GLC planned and performed the verification by obtaining evidence and other information and explanations that GLC considers necessary to give reasonable assurance that reported GHG emission reductions are fairly stated.

In GLC's opinion, the GHG emissions reduction for the "65MW Dagushan Hydropower Project in China" as reported in the Monitoring Report issued on 2011-06-07, ver.2.0 are calculated without material misstatements in a conservative and appropriate manner.

The GHG emission reductions were correctly calculated on the basis of the approved monitoring methodology of ACM0002, ver.10 and the revised and approved monitoring plan contained in the validated Project Design Document for the project.

Germanischer Lloyd Certification GmbH herewith confirms that the project has achieved emission reductions in the above mentioned reporting period as follows:

Emission reductions (2009-07-22 to 2009-12-31)	139,394	t CO_{2e}
Emission reductions (2010-01-01 to 2010-05-08)	32,621	t CO_{2e}
Emission reductions in total	172,015	t CO_{2e}

<Beijing>, 2011-07-10

<Ruifeng, Li>
Verification Team Leader

.

5. REFERENCES

Reference	Document
/1/	CDM-EB: Clean Development Mechanism Validation and Verification Manual (Version 1.2 as per EB 55).
/2/	Gansu Zhangye Dagushan Hydropower Co., Ltd.: CDM Project Design Document for project: "65MW Dagushan Hydropower Project in China" Version 05, 2010-02-04.
/3/	Gansu Zhangye Dagushan Hydropower Co., Ltd.: Monitoring Report of "65MW Dagushan Hydropower Project in China", Version 02, 2010-06-07.
/4/	Gansu Zhangye Dagushan Hydropower Co., Ltd.: Emission reduction calculation spreadsheet" V1.0 2011-06-07.
/5/	Gansu Province Hydraulic Electricity Survey and Design Institute, First Branch: A_{PJ} Measurement Result Report , dated 2011-04-25
/6/	Gansu Zhangye Dagushan Hydropower Co., Ltd.: VCS PD, dated 2011-03-21.
/7/	ISO 14064-3:2006; Greenhouse gases – Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions; http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=38700; (2009-09-25)
/8/	ISEA3000 (Revised) Assurance Engagements other than Audits or Reviews of Historical Financial Information. Available online : http ://www.ifac.org/IAASB/ProjectHistory.php?ProjID=0008; (2009-09-25)
/9/	TÜV Nord: Validation Report for the CDM project "65MW Dagushan Hydropower Project in China", Report No.: QT-EC0417-08-08/233 dated 2010-03-08.
/10/	GLC: VCS Additional Validation Report for "65MW Dagushan Hydropower Project in China", Validation Report No. VCS 023.rev.01 dated 2011-06-07.
/11/	Electric Energy Measurement Centre of Gansu Electric Power Corporation: Calibration Authorization Certificate issued by Gansu Province Quality and Technology Supervision Bureau, Date of validity from 2006-01-05to 2011-01-04.

Reference	Document
/12/	Gansu Zhangye Dagushan Hydropower Co., Ltd.: Aggregated Monthly Report, from July 2009 to May 2010.
/13/	CDM-EB: Approved CDM Methodology ACM0002, ver.10, "Consolidated baseline methodology for grid-connected electricity generation from renewable sources".
/14/	GLC GmbH: Germanischer Lloyd CDM Procedures
/15/	IPCC: 1996 IPCC Guidelines for National Greenhouse Gas Inventories: work book IPCC: 2006 IPCC Guidelines for National Greenhouse Gas Inventories: work book
/16/	Henan Province Electrical Industry Bureau: National Standard of Electrical Industry – Technical Administrative Code of Electric Energy Metering DL/T448-2000, 2000
/17/	National Standardization Management Committee: Verification regulation of electronic electric energy meter JJG 596-1999, 1999
/18/	Gansu Zhangye Dagushan Hydropower Co., Ltd.: Electricity Transaction Notes (ETN), from July 2009 to May 2010.
/19/	Gansu Zhangye Dagushan Hydropower Co., Ltd.: Electricity Sales Invoices, from July 2009 to May 2010.
/20/	Gansu Zhangye Dagushan Hydropower Co., Ltd.: Power Purchase Agreement, valid from 2009-04-01 to 2012-05-31.
/21/	Gansu Zhangye Dagushan Hydropower Co., Ltd.: Business License
/22/	Gansu Province Power Company Electric Energy Calibration Institute: calibration records for ten meters.
/23/	Gansu Zhangye Dagushan Hydropower Co., Ltd.: Staff Training Test and Record.
/24/	Gansu Zhangye Dagushan Hydropower Co., Ltd.: Plant Operation and Management Regulations.

ANNEX

List of CLs, CARs, FARs

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Verification report clarification requests and corrective action requests by verification team	Date (dd/mm/yyyy)	Summary of project owner response	Date (dd/mm/yyyy)	Validation team conclusion	Date (dd/mm/yyyy)
CAR 1 Please provide VCS Monitoring Report as per VCS 2007 version 01 to DOE.	08/10/2010	Provided， see the attachment	06/05/2011	The Monitoring Report has been provided. CAR 1 is thus closed out.	01/06/2011
CAR 2 The start date in Emission Reduction Sheet is from 1st July 2009, please revise it to actual start date 22nd July 2009, and provide relevant evidence for electricity generated.	08/10/2010	Revised, the relevant evidence islisted in the attachment.	06/05/2011	The revision has been made on the Emission Reduction Sheet. The ETNs and sales invoices are also available. CAR 2 is thus closed out.	01/06/2011
CAR 3 The electricity data from 1st May 2010 to 8th May 2010 shall be included in Emission Reduction Sheet.	08/10/2010	It is difficult to seperate power generation of the whole month,in the view of conservation， this part fo power generation will be deleted.	06/05/2011	As PP voluntarily disclaim the emission reduction generated from 1st May 2010 to 8th May 2010, the mentioned emission reduction is not included. This is considered as conservative. CAR 3 is thus closed out.	01/06/2011
CAR 4 The electricity data for December 2009 and April 2010 in Emission Reduction Sheet are not consistent with their invoice value, please make revisions and provide the updated Emission Reduction Sheet to DOE.	08/10/2010	There are default power generation in December 2009 and April 2010. The default power generation is a kind of way to supervise the power enterprise by Gansu province electricity regulatory commission. The data on VAT invoice is the data after deducting the default power generation. Therefore,it is different from the power purchase	06/05/2011	As stipulated in Power Purchase Agreement, the default power generation will not be settled by the grid company. In addition, from conservative perspective, the value on invoice should be used for emission reduction. CAR 4 is closed out.	01/06/2011

Verification report clarification requests and corrective action requests by verification team	Date (dd/mm/yyyy)	Summary of project owner response	Date (dd/mm/yyyy)	Validation team conclusion	Date (dd/mm/yyyy)
		settlement notice. For the calculation of the CER, we used the value on invoices, revision has been made.			
CAR 5 During on-site inspection, it is found many inconsistencies (e.g. accuracy & location of metering equipments, formular of net electricity calculation) of monitoring report against description in registered PDD, hence, the revision of monitoring plan is neccesary.	08/10/2010	it has been approved on March 3rd 2011. it has been stated in Monitoring report.	06/05/2011	The revised monitoring plan has been approved by EB on 3rd March 2011 and correctly applied in the monitoring report. CAR 5 is thus closed out.	01/06/2011
CL 1 Please provide all calibrtion reports for metering equipments during VCS calatation period.	08/10/2010	Provided， see the attachment	06/05/2011	The calibration reports for all meters that valid from this monitoring period have been submitted and the accreditation certificate for calibration entity is also checked as valid. CL 1 is thus closed out.	01/06/2011
CL 2 Please provide training records for station staff to ensure they are qualified for daily station operation to DOE.	08/10/2010	Provided， see the attachment	06/05/2011	The training records are provided, including test paper for on-site operation by staff and the staff qualification certificate for dispatching, approved by local provincial electricity center. Together based on the on-site inspection and	01/06/2011

Verification report clarification requests and corrective action requests by verification team	Date (dd/mm/yyyy)	Summary of project owner response	Date (dd/mm/yyyy)	Validation team conclusion	Date (dd/mm/yyyy)
				observation, the staff are qualified for daily operation for the proposed project. CL 2 is thus closed out.	
CL 3 Please provide annual mornitoring report for area of reservoir after the implementation of the project activity.	08/10/2010	Provided， see the attachment	06/05/2011	The monitoring report compiled by a qualified third party named as Gansu Province Hydeoelectric Survey and Design Institute First Branch dated 25th April 2011 has been provided. It described the mornitoring mehod, equipment and industrial standard. The monitoring report is assessed as valid and the result is 138,047m^2 . CL 3 is thus closed out.	01/06/2011
CL 4 Please provide daily operation log as stated in registered PDD to DOE.	08/10/2010	Provided, please check.	06/05/2011	The daily operation log (aggregated monthly report) has been provided and checked as valid. CL 4 is thus closed out.	01/06/2011