VERIFICATION REPORT (V-2-I-01-L-0212-VE/1.2)

GVK INDUSTRIES LIMITED

COMBINED CYCLE NATURAL GAS BASED GRID CONNECTED POWER PLANT AT JEGURUPADU, INDIA

PERRY JOHNSON REGISTRARS

Carbon Emissions Services, Inc.

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Summary:

- A brief description of the verification and the project,

  Verification:
  GVK Industries Limited has commissioned Perry Johnson Registrars Carbon Emissions Services, Inc. to perform verification of the project – "Combined cycle natural gas based grid connected power plant at Jegurupadu, India" under the Verified Carbon Standard (VCS) version 3.3 for the period 14th April 2009 to 13th April 2011 (both days included). The validation of project activity was concluded by Perry Johnson Registrars Carbon Emissions Services, Inc. under Verified Carbon Standard (VCS) and a validation report dated 11th April 2011 version 01 against the registered VCS PD dated 31st March 2011, version 04. The current report describes the verification work undertaken.

  Project:
  The project activity involves installation and operation of 228 MW combined cycle Natural gas (less carbon intensive fuel) based power generation unit. The electricity generated by the proposed project will be exported to the Southern regional grid and hence, displaces the carbon intensive fossil fuel based electricity in the grid.

- The purpose and scope of verification
  → To verify that the project activity is implemented as per the project details of the validated VCS project description document (PD) dated 31st March 2011, version 04.
  → To assess whether the emissions reductions determined are in conformance with the monitoring plan of the VCS PD and the approved methodology (AM0029, version 03).
  → To express a conclusion whether reported data are accurate, complete, consistent, and transparent with a reasonable level of assurance and free of omission or material error, based on the review of the reported data and emission reduction calculations.
- The method and criteria used for verification
  → Completeness check and desktop review of the monitoring report
  → Onsite inspection and issuance of findings from the audit
  → Resolution of the findings and preparation of the verification report
- Any findings, restrictions of uncertainties related to the verification
  → Based on the assessment of the GHG emission reductions reported in the initial version of the monitoring report version 01 dated 15th September 2011, PJRCES had requested responses from the project proponent through means of Clarification Requests (CLs) & Corrective Action Requests (CARs) and issued in the draft verification report on 06th January 2012.

- Summary of the verification conclusion
  - → In PJRCES's opinion, the GHG emission reductions reported in the monitoring report final version 3.3, dated 19th June 2013 is fairly stated. Based on the assessment, PJRCES is able to certify that the implementation of the project has resulted in GHG emission reductions of **14,07,860** tCO_2 equivalent during the current monitoring period from 14th April 2009 to 13th April 2011.
  - → PJRCES's opinion regarding the reported emission reductions for the given monitoring period is based on the information sought and also reviews of publicly available information where applicable. ISO-14064 guidelines have been applied in principle to assess the key issues like accuracy, completeness and conservativeness of the information. PJRCES's verification/certification of GHG emissions is limited to this information evaluation.
- Issuance and utilization of certified GHG-emission reductions is beyond the scope of PJRCES.

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1 INTRODUCTION

1.1 Objective

The verification under VCS standard version 3.3 /22/ is the independent ex-post quantification and certification of the greenhouse gas (GHG) emission reductions achieved by a project activity which has completed validation under Verifiedy Carbon Standard (VCS) 2007.1 Standard.

The above work is carried out through an independent assessment and a written assurance is provided on the GHG emission reductions achieved for the period specified.

1.2 Scope and Criteria

The scope of the verification covers independent objective review and ex-post determination of the monitored GHG emission reductions by the project activity "Combined cycle natural gas based grid connected power plant at Jegurupadu, India".

The specific scope of the verification work involves:

- → To verify that the project activity is implemented as per the project details of the validated project description document (PD) 31st March 2011, version 04 /3/.
- → To assess whether the emissions reductions determined are in conformance with the monitoring plan of the VCS PD and the approved methodology.
- → To express a conclusion whether reported data are accurate, complete, consistent, and transparent with a reasonable level of assurance and free of omission or material error, based on the review of the reported data and emission reduction calculations.

The project is assessed against the verification requirements of VCS standard version 3.3 including the criteria that the emission reductions are real, measurable, transparent and conservative. The approach adopted by PJRCES verification team is risk-based, drawing on an understanding of the risks associated with reporting of GHG emissions data and the controls in place to mitigate these.

The work carried out by PJRCES is free from any conflict of interest.

The request for issuance of Verified Carbon Units (VCUs), verified and certified by PJRCES, shall be made by the project proponent to the VCS registry in accordance with the most recent version of the "VCS Guidance Document: VCS Project Registration and VCU Issuance process". In view of the above, PJRCES's responsibility is limited only to verification and certification of the GHG emission reductions achieved during the specified period.

1.3 Level of assurance

In line with VCS standard version 3.3 requirements and as per ISO 14064-3:2006 paragraph A.2.3.2, a "***reasonable level of assurance***" is defined for the verification of the project.

This implies that, based on the process and procedures conducted, PJRCES confirms that the GHG assertion in the monitoring report.

- → is materially correct and is a fair representation of the GHG data and information, and
- → is prepared in accordance with VCS requirements, the validated VCS PD and the approved methodology for information pertaining to GHG quantification, monitoring and reporting.

The verification work is carried out as per this requirement and details are presented in the Verification statement in section 2 below.

1.4 Summary Description of the Project

The purpose of the project activity is to set up and operate a natural gas based combined cycle power plant with a total installed capacity of 228 MW. The plant consists of Gas Turbine of 148 MW & Steam Turbine of 80 MW. Hence, the combined generation capacity of the project is 228 MW. The generated electricity is being sold to Andhra Pradesh State Electricity Board (APSEB) which is a part of Southern regional grid of India.

Table 1: Project Details /3/

Particulars	Details
Title of the Project	*Combined cycle natural gas based grid connected power plant at Jegurupadu, India*
Methodology used	*AM0029, version 03*
VCS Crediting period	*14th April 2009 to 13th April 2019*
Monitoring period	*14th April 2009 to 13th April 2011*

Table 2: Location Detail /1/ /3/ /4/ /5/ /6/ /23/

Site Location (District/State)	North (Latitude)	East (Longitude)	Commissioning date (DD-MM-YYYY)
Jegurupadu village south east of Rajahmundry in east Godavari district of Andhra Pradesh, India	*16° 59' 42"*	*81° 53' 12"*	*14/04/2009*

In the absence of proposed project activity, same amount of electricity would have been generated by coal based power generation unit (detailed discussion provided in the baseline section below). Natural gas being less carbon intensive fuel compared to coal would result in greenhouse gas emissions.

The estimated amount of greenhouse gas emission reductions from the proposed project activity for the current monitoring period from 14th April 2009 to 13th April 2011 is 14,07,860 tCO_2 equivalent.

2 VALIDATION PROCESS, FINDINGS AND CONCLUSION

2.1 Validation Process

The project had already been validated and registered against the requirements of Verified Carbon Standard (VCS) 2007.1 /22/. The project had been validated by PJRCDM[1] and final validation report dated 11th April 2011 /4/ and final registered VCS PD dated 31st March 2011 /3/ have already been issued.

2.2 Validation Findings

2.2.1 Gap Validation

Not Applicable as the project is already validated and registered under VCS.

2.2.2 Methodology Deviations

NA

2.2.3 Project Description Deviations

PJRCES observed during the site visit a number of deviations from the project description available in the registered VCS PD. In line with the paragraph 3.6 (Project Description Deviations) of the VCS Standard version 03.3 dated 4th October 2012, PP has presented the deviations from project description in the revised Monitoring report. PJRCES has concluded that the deviation does not impact the applicability of the methodology, additionality or the appropriateness of the baseline scenario, and the project remains in compliance with the applied methodology and hence the deviation has been described and justified in the monitoring report.

Parameter as available in Monitoring report	**Description as per registered PD**	**Deviation applied in Monitoring report**	**Conclusion/Opinion**
$EF_{CO2,f,y}$ in tCO_2/GJ (CO_2 Emission factor per unit of energy of natural gas in year y)	EF_{NG} in $kgCO_2/TJ$	$EF_{CO2,NG}$ in tCO_2/GJ	The revised notation and the unit of parameter in the monitoring report is in compliance with the applied methodology and hence acceptable.
$EF_{NG,upstream,CH4}$ in tCH_4/GJ (Emission factor for upstream fugitive emission)	The parameter is not available in table format in the registered VCS PD.	PP has now mentioned this parameter under Section 3.1 (Data and Parameter available at Validation) of the	This is revision in terms of representation and the value remains same in both registered VCS PD and MR which is also in compliance with the VCS rules and the

[1] The DOE accreditation has been shifted from Perry Johnson Registrars Clean Development Mechanism, Inc. to Perry Johnson Registrars Carbon Emissions Services, Inc. in due course of validation.

		revised MR.	applied methodology.
$EF_{CO2,upstream,LNG}$ in tCO_2/TJ (Emission factor for upstream CO_2 emissions due to fossil fuel combustion / electricity consumption associated with the liquefaction, transportation, re-gasification and compression of LNG into a natural gas transmission or distribution system)	The parameter is not available in table format in the registered VCS PD.	PP has now mentioned this parameter under Section 3.1 (Data and Parameter available at Validation) of the revised MR.	This is revision in terms of representation and the value remains same in both registered VCS PD and MR which is also in compliance with the VCS rules and the applied methodology.
$FC_{F,y}$ in SCM (Annual quantity of fuel "f" consumed in project activity).	The natural gas consumption has been calculated from the following sources. Primary Source: The daily readings are recorded manually and are stored in the power plant log book. Cross Check Source: Invoices from GAIL	PP has mentioned following source for the natural gas consumption in the MR. Primary Source**:** Fortnightly Joint Ticket Readings received from GAIL. Cross Check Source: The quantity of natural gas consumption is cross checked with the check meter installed at PP's end. Further for the calculation of emission reductions, higher values between main meter and check meter has been considered on a conservative basis.	This revision for the said parameter is in line with the VCS Standard and the applied methodology. The fortnightly joint ticket reading is an authentic and reliable source which is also primary and hence considered this as main source of data is acceptable to PJRCES. Further for the calculation of emission reduction, PP has followed a conservative approach by choosing the higher values between the main and check meter.
$NCV_{f,y}$ in GJ/m^3 (Net Calorific Value of fuel f) The NCV is calculated based on the monitoring value of GCV using 10% delta factor.	$NCV_{f,y}$ in kcal/SCM Primary Source: Invoice from supplier Cross Check Source: 1. Check meter installed at PP's	NCV_{NG} in GJ/SCM Primary Source: Fortnightly Joint Meter Reading which provides GCV using 10% delta factor. Cross Check Source: 1. The data for the complete monitoring period is not available for the check meter	This revision for the said parameter is in line with the VCS Standard and the applied methodology. The fortnightly joint ticket reading is an authentic and reliable source which is also primary and hence considered this as main source of data which is acceptable to PJRCES.

	end. 2. The NCV of natural gas is cross checked with the invoices that are obtained from GAIL.	and hence PP has removed the check meter reference as this is also not required as per the applied methodology. 2. There is no requirement for cross check as per the applied methodology and also it is a third party calculated value (gas supplier) in line with the monitoring methodology AM0029 which is an authentic source of data.	
$FCf_{,LNG,y}$ in SCM (Annual quantity of fuel "f" consumed in project activity)	The LNG consumption has been calculated from the following sources. Primary Source: The daily readings are recorded manually and are stored in the power plant log book. Cross Check Source: Invoices from GAIL	PP has mentioned following source for the LNG consumption in the MR. Primary Source**:** Fortnightly Joint Ticket Readings received from GAIL. Cross Check Source: The quantity of LNG consumption is cross checked with the check meter installed at PP's end. Further for the calculation of emission reductions, higher values between main meter and check meter has been considered on a conservative basis.	This revision for the said parameter is in line with the VCS Standard and the applied methodology. The fortnightly joint ticket reading is an authentic and reliable source which is also primary and hence considered this as main source of data is acceptable to PJRCES. Further for the calculation of emission reduction, PP has followed a conservative approach by choosing the higher values between the main and check meter.
$NCVL_{NG}$ in GJ/m^3 (Net Calorific Value of fuel f - LNG) The NCV is calculated based on the monitoring value of GCV using 10% delta factor.	This parameter was not mentioned in the registered PD.	$NCVL_{NG}$ in GJ/SCM Primary Source: Fortnightly Joint Meter Reading which provides GCV using 10% delta factor. Cross Check Source: 1. The data for the	This revision for the said parameter is in line with the VCS Standard and the applied methodology. The fortnightly joint ticket reading is an authentic and reliable source which is also primary and hence considered this as main source of data which is

		complete monitoring period is not available for the check meter and hence PP has removed the check meter reference as this is also not required as per the applied methodology. 2. There is no requirement for cross check as per the applied methodology and also it is a third party calculated value (gas supplier) in line with the monitoring methodology AM0029 which is an authentic source of data.	acceptable to PJRCES.
$COEF_{f,y}$ in tCO_2/m^3 (CO_2 Emission Coefficient)	This parameter was not mentioned in the registered PD.	$COEF_{f,y}$ in tCO_2/m^3 (This is calculated parameter)	This is in compliance with the methodology.
$EG_{Export,y}$ in MWh (Gross electricity exported by the project plant in year y)	This parameter was not mentioned in the registered PD.	The parameter has now been included as a monitoring parameter and a complete description of Electricity export has been provided in the Section 3.2 of the revised Monitoring report. <u>Primary Source</u>: Joint Meter Reading (JMR) has been used as the primary source of data for this parameter. <u>Cross Check Source</u>: The Invoices raised from GVK to APTRANSCO has been used to cross check the data for this parameter. Further for the calculation of emission reductions, lower value between main meter and check	This revision for the said parameter is in line with the VCS Standard and the applied methodology. The Joint Meter Reading (JMR) is an authentic and reliable source which is also primary and hence considered this as main source of data is acceptable to PJRCES. Further for the calculation of emission reduction, PP has followed a conservative approach by choosing the lower values between the main and check meter.

		meter has been considered on a conservative basis.	
$EG_{Import,y}$ in MWh (Gross electricity imported by the project plant in year y)	This parameter was not mentioned in the registered PD.	The parameter has now been included as a monitoring parameter and a complete description of Electricity import has been provided in the Section 3.2 of the revised Monitoring report. Primary Source: Joint Meter Reading (JMR) has been used as the primary source of data for this parameter. Cross Check Source: The Invoices raised from GVK to APTRANSCO has been used to cross check the data for this parameter. Further for the calculation of emission reductions, lower value between main meter and check meter has been considered on a conservative basis.	This revision for the said parameter is in line with the VCS Standard and the applied methodology. The Joint Meter Reading (JMR) is an authentic and reliable source which is also primary and hence considered this as main source of data is acceptable to PJRCES. Further for the calculation of emission reduction, PP has followed a conservative approach by choosing the lower values between the main and check meter.
$EG_{PJ,y}$ in MWh (Net Electricity exported by the project plant)	PP has mentioned the following source for the net electricity supplied to the grid Primary Source: The readings taken from the export meter present in the tariff metering room present in the switch yard. The readings are stored in the power plant log book. Cross Check	PP has now mentioned the following source for the net electricity in the MR. Main Source: Joint Meter Reading (JMR) as a primary source. Cross Check Source: The Invoices raised from GVK to APTRANSCO has been used to cross check the data for this	This revision for the said parameter is in line with the VCS Standard and the applied methodology. The Joint Meter Reading (JMR) is an authentic and reliable source which is also primary and hence considered this as main source of data is acceptable to PJRCES. Further for the calculation of emission reduction, PP has followed a conservative approach by choosing the lower values between the main and check meter.

	Source: Check meter installed by GVK	parameter. Further for the calculation of emission reductions, lower value between main meter and check meter has been considered on a conservative basis.	
$EF_{BL,upstream,CH4}$ in tCO_2/MU (Emission factor for upstream fugitive methane emissions occurring in the absence of the project activity) & PE_y in tCO_2 (Project emission under project activity.)	This parameter was not mentioned in the registered PD.	$EF_{BL,upstream,CH4}$ in tCO_2/MU and & PE_y in tCO_2 (These are calculated parameter) has now been included as monitoring parameter in the revised monitoring report.	This is in compliance with the applied methodology and VCS Standard.

PJRCES has assessed the deviations and found that they have been appropriately described and justified and project remains in compliance with VCS rules, applied methodology and hence acceptable and shall also be reported in all subsequent verification reports.. PP has justified all the deviations in the Monitoring report which is in line with the paragraph 3.6.1 of the VCS Standard, version 3.3.

2.2.4 New Project Activity Instances

NA

2.3 Validation Conclusion

The project is already validated and registered under the Voluntary Carbon Standard (VCS) 2007.1. PJRCES concludes that the current VCS project activity complies with all the latest requirement of VCS standard version 3.3.

3 VERIFICATION PROCESS

3.1 Method and Criteria

The project activity applies approved baseline and monitoring methodology AM0029 version 03 “Baseline Methodology for Grid Connected Electricity Generation Plants using Natural Gas” /9/. For verification of emission reductions, PJRCES’s approach involves broadly three steps:

1) Completeness check and desktop review of the monitoring report.
2) Onsite inspection and issuance of findings from the audit.
3) Resolution of the findings and preparation of Verification report

The following team members from PJRCES were involved in those steps:

Table 3: Verification Team Details

***Verification Team*:**

Name	Qualification	Competency			Task Performed

		Meth Expert	Host Country Experience	DR	SV	RI	RP	Technical Review and Final Approval
Rohit Badaya	LV & TL	☒	☒	☒	☒	☒	☒	
Chirag Gajjar	LV & TM	☒	☒	☒	☒	☒		
Sathis Kumar	ITR and FA	☒	☒		NA			☒

Note:

1) LV - Lead Verifier, TL – Team Leader, TM – Team Member, ITR – Independent Technical Reviewer, FA - Final Approver
2) DR – Desk review of monitoring report, supporting documents and preparation of draft verification report, SV – Site visit, RI – Resolution of Issues, RP – Final verification report preparation.

3.2 Document Review

On receipt of the monitoring report from the client, the completeness of information was checked as per VCS standard version 3.3 /22/. A desktop review was further carried out to assess the following:

- → The validated VCS PD dated 31st March 2011, version 04 /3/ with the monitoring plan.
- → The validation report dated 11th April 2011 version 01 /4/.
- → The emissions reduction calculation method /2/ used in the applied methodology AM0029, version 03 /9/ and the VCS PD /3/.
- → The monitoring report version 01 dated 15th September 2011 /1/, updated monitoring report version 3.3, dated 19th June 2013 /1/, including frequency of monitoring and the calculation of emission reductions for the period.
- → Other external documents like JMR /10/, invoices /16/, calibration certificates /17//18//19/ and commissioning certificates /7/, grid emission factor /15/, etc. applied

A complete list of all documents reviewed is attached in Appendix I of this report.

3.3 Interviews

Detailed verification of all data contained in the monitoring report was performed during the site visit on 24/11/2011 and 25/11/2011. List of personnel interviewed and issues discussed during the site visit is as provided below:

Table 4: List of Personnel Interviewed /23/

Name / Designation / Company	Interviewed on
Manali Mane, Analyst, General Carbon Advisory Services Ltd. N. Srinivasan, General Manager, GVK Power Limited B. Praveen, Technician, GAIL S Srinivasan, Manager K. M. Lingeswar Rao, Dy. Manager (O), GVK Energy Limited	• Detailed check of monitoring report and ER sheet against the supporting documents (Joint meter readings, Joint ticket readings, Invoices etc.) • Check of installation of Equipments and metering provision for electricity exported to grid. • Check of calibration record of meters (reports) • Check of procedures and implementation of O&M schedules • Check of all the supporting documents (commissioning certificates, energy purchase agreement, internal audit reports, operation and maintenance agreement, training certificates, daily generation reports).

Furthermore, the interactions with Manali Mane and Suhela Shaikh from General Carbon Advisory Services Limited (consultant for the project) were used to confirm the selected information and to resolve issues identified during the verification.

3.4 Site Inspections

An onsite visit was carried out by PJRCES between 24/11/2011 and 25/11/2011 for physical inspection of the project activity. The actual operation of the project as described in the VCS PD, the JMR sheets /10/, Joint Ticket Readings /11//12/13//14/ and Invoices /16/ were reviewed and discussed during the site visit and issues identified in the desktop review of submitted documents were discussed with the above representatives of project proponents and operation and maintenance personnel.

Objective:

→ Objective of the site visit was to physically inspect the equipments installed in the project activity and cross checking the implementation of monitoring plan in-line with the applied methodology (AM0029, version 03) and the validated VCS PD.

Method:

→ PJRCES personnel's visited the site where the project was located and confirmed the operation of the equipments under project activity.

→ Also, PJRCES made a visit to the monitoring equipments for cross checking the means of monitoring.

→ Further to that, PJRCES also made a visit to the place where interconnection metering point exists and where project activity actually delivers the net energy. Further, to that PJRCES also, checked the meters used and records of the past meters used for calibration requirements and accuracy class.

3.5 Resolution of Any Material Discrepancy

→ Based on the site inspection and review of records including the monitoring plan, a list of non conformities; Corrective Action Requests (CAR) were raised. The non conformities could be related to lack of adherence to the VCS standard version 3.3 requirements, non-conformance to the monitoring plan of as defined in the VCS validated PD or where evidence provided is found insufficient to prove conformity. They could also be mistakes in applying data/ assumptions and in calculation of emission reductions.

→ If information made available is insufficient to transparently arrive at the stated conclusion, a Clarification request (CL) is raised and communicated to the project proponent.

→ Observations may also be raised which are for the benefit of future verification period. These, however, have no impact upon the completion of the current verification activity.

→ On receipt of response from the project developer, the adequacy with compliance with VCS requirements is checked along with a revised monitoring report. Closure of comments raised occurs only if the response provided and correction made fully complies with the stated requirements of the methodology applied.

→ The list of CARs/ CLs raised and the response provided and reasons for closure are provided Appendix-2.

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

Implementation status of the project activity(s), including any material discrepancies between the project and the project description:

→ The purpose of the project activity is to set up and operate a natural gas based combined cycle power plant with a total installed capacity of 228 MW. The plant consists of Gas Turbine of 148 MW & Steam Turbine of 80 MW. Hence, the combined generation capacity of the project is 228 MW. The generated electricity is being sold to Andhra Pradesh State Electricity Board (APSEB) which is a part of Southern grid regional grid of India.

Project Owner	Site Location	Commissioning Date

GVK Industries Limited	Jegurupadu village south east of Rajahmundry in east Godavari district of Andhra Pradesh, India	14/04/2009 /7/

→ The implementation of the project activity was as described in the VCS validated PD, checked against supportive documents presented. PJRCES was able to verify that the there was no change in project design compared to the design presented in the VCS validated PD, dated 31st March 2011, version 04.

Implementation status of the monitoring plan and the completeness of monitoring, including any material discrepancies between the project and the project description:

→ The GHG emission reductions are calculated based on the net electricity exported to the respective grid (Southern grid of India). The main and check meter system were used to measure the various parameters used in the calculation of emission reductions.
→ Complete data of electricity supply to the grid and Gas consumption was available for the entire verification period (14th April 2009 to 13th April 2011) which was verified by PJRCES.

Any remaining issues from previous validation or verification
This is the first verification of the project activity under VCS standard version 3.3. There are no unresolved issues from validation which may impact the calculations of emission reductions of the current verification. However few deviations from the project description in the registered VCS PD has been taken up during the current verification (please refer Section 2.2.3 of the Monitoring report).

PJRCES confirmed that the responsibilities and authorities for monitoring and reporting were in accordance with what was stated in monitoring plan. By means of desk review and onsite assessment it was confirmed that parameters were monitored in accordance with the monitoring plan.

4.2 Accuracy of GHG Emission Reduction or Removal Calculations

PJRCES assessed the different areas (as mentioned below) which can affect the accuracy of the final emission reduction calculations:

Electricity exported by the project plant, $EG_{Export,y,}$ Mega Watt hour (MWh):
The electricity export is measured in the Tariff metering room through two lines i.e. Line 1 and Line 2, each line has one main meter and check energy meter. The energy meters are 3 phase 4 wire meters of standard make having an accuracy class of 0.2 S.
The meters record electricity generation on continuous basis and the export readings are recorded on monthly basis as Joint Meter Reading. The readings are cross checked with the Invoices raised from GVK to APTRANSCO. The readings are also stored in log books on daily basis for PP's record purpose.
The calibration of meters is done once in six months. The calibrations were conducted by the *"Electronics Test and Development Centre".* The calibration certificates /17/ has been checked during the site visit.

The summary of calibration of meters is as follows:

Main Meter

Serial Number	Accuracy Class	Calibration frequency	Calibration Date	Correction Factor applied (due to delayed calibration)
08081471 (Line 1)[2] (installed on 09/10/2010)	0.2S	Once in six months	15/07/2010	10/09/2010 to 13/04/2011[3]
07615226 (Line 1)[4] (installed on 18/12/2010)	0.2S	Once in six months	26/05/2011	Not Applicable
08081471 (Line 2) (installed on 15/07/2010)	0.2S	Once in six months	26/05/2011	14/04/2009 to 10/05/2009
07615226[5] (Line 2) (installed on 05/08/2008)	0.2S	Once in six months	05/08/2008 17/04/2009 15/07/2010	10/10/2009 to 13/04/2011

Check Meter

Serial Number	Accuracy Class	Calibration frequency	Calibration Date	Correction Factor applied (due to delayed calibration)
07659747 (Line 1)	0.2S	Once in six months	30/09/2010	April 2009 - October 2010 February 2011 - April 2011
07659748 (Line 2)	0.2S	Once in six months	30/09/2010	April 2009 - October 2010 February 2011 - April 2011

PP has calculated the "electricity exported to the grid" based on both the main meter and check meter. The lower value between the two values has been chosen on conservative basis for the calculation of emission reduction calculations. The electricity exported to the grid is 3364062[6] MWh during the monitoring period which has been used for the calculation of emission reductions.

Electricity imported by the project plant, $EG_{importt,y,}$ Mega Watt hour (MWh):

The electricity import is measured in the Tariff metering room through two lines i.e. Line 1 and Line 2, each line has one main meter and check energy meter. The energy meters are 3 phase 4 wire meters of standard make having an accuracy class of 0.2 S.

[2] The main meter line1 was commissioned on 10/09/2010. During this period main meter line 2 was in operation and calibration error has been applied from 10/09/2010 onwards.

[3] The correction factor to the main meter readings from 10/09/2010 to 13/04/2011 has been applied on a conservative basis.

[4] The main meter line1 was commissioned on 10/09/2010. During this period main meter line 2 was in operation and calibration error has been applied from 10/09/2010 onwards.

[5] This meter number 08081471 was replaced with 07615226 on 15/07/2010 and was in operation till the end of monitoring period.

6 The electricity export of "3364062 MWh" is after applying correction factor to the main meter and check meter readings and choosing the minimum of the two values for each month. The actual electricity export based on the main meter and check meter before applying the correction factor is 3371964 MWh and 3372976 MWh respectively.

The meters record electricity generation on continuous basis and the export and import readings are recorded on monthly basis as Joint Meter Reading. The readings are cross checked with the Invoices raised from GVK to APTRANSCO. The readings are also stored in log books on daily basis for PP's record purpose.

The calibration of meters is done once in six months. The calibrations were conducted by the *"Electronics Test and Development Centre".* The calibration certificates /17/ have been checked during the site visit.

The summary of calibration of meters is as follows:

Main Meter

Serial Number	Accuracy Class	Calibration frequency	Calibration Date	Correction Factor applied (due to delayed calibration)
08081471 (Line 1)[7] (installed on 09/10/2010)	0.2S	Once in six months	15/07/2010	10/09/2010 to 13/04/2011[8]
07615226 (Line 1)[9] (installed on 18/12/2010)	0.2S	Once in six months	05/08/2008 17/04/2009	10/09/2010 to 13/04/2011
08081471 (Line 2) (installed on 15/07/2010)	0.2S	Once in six months	26/05/2011	14/04/2009 to 10/05/2009
07615226[10] (Line 2) (installed on 05/08/2008)	0.2S	Once in six months	05/08/2008 17/04/2009 15/07/2010	10/10/2009 to 13/04/2011

Check Meter

Serial Number	Accuracy Class	Calibration frequency	Calibration Date	Correction Factor applied (due to delayed calibration)
07659747 (Line 1)	0.2S	Once in six months	30/09/2010	April 2009 - October 2010 March 2011 - April 2011
07659748 (Line 2)	0.2S	Once in six months	30/09/2010	April 2009 - October 2010 March 2011 - April 2011

[7] The main meter line1 was commissioned on 10/09/2010. During this period main meter line 2 was in operation and calibration error has been applied from 10/09/2010 onwards.

[8] The correction factor to the main meter readings from 10/09/2010 to 13/04/2011 has been applied on a conservative basis.

[9] The main meter line1 was commissioned on 10/09/2010. During this period main meter line 2 was in operation and calibration error has been applied from 10/09/2010 onwards.

[10] This meter number 08081471 was replaced with 07615226 on 15/07/2010 and was in operation till the end of monitoring period.

PP has calculated the "electricity imported to the grid" based on both the main meter and check meter. The higher value between the two values has been chosen on conservative basis for the calculation of emission reduction calculations. The electricity import to the grid is 851.64[11] MWh during the monitoring period which has been used for the calculation of emission reductions.

Net Electricity exported by the project plant, $EG_{PJ,y,}$ Mega Watt hour (MWh):

The net electricity exported by the project plant is calculated as the difference of electricity export and electricity imported to the project activity. The electricity export and import is measured in the Tariff metering room through two lines i.e. Line 1 and Line 2, each line has one main meter and check energy meter. The energy meters are 3 phase 4 wire meters of standard make having an accuracy class of 0.2 S.

The meters record electricity generation on continuous basis and the export and import readings are recorded on monthly basis as Joint Meter Reading. The readings are also stored in log books on daily basis for PP's record purpose. The calibration details for the electricity export and import are already indicated in the above two tables.

Quantity of NG consumed in the project activity, $FC_{NG,}$ SCM:

The Natural gas supplied to the plant is measured on daily basis by the gas flow meters installed at the gas supplier terminal (of GAIL) at the project site by the Gas supplier. The gas consumption is measured through two loops i.e Loop A and Loop B. The readings are reported through fortnightly Joint Ticket Readings received from GAIL. The flow meters are Ultrasonic-Flow Meters (USM) of Daniel make and have an accuracy class of 0.23%.

PP has also installed check meters at their end to cross check the quantity of natural gas. The check meters are of Yokogawa make and have accuracy class of 0.25% of span and 0.1% of span for pressure bfr main shut off valve and temperature bfr main shut off valve respectively. PP has chosen the maximum of the main meter and check meter readings for the calculation of emission reductions on conservative basis.

The calibration is done once in a year for all the Gas flow meters. The calibration certificates /18/ for the main meter and check meter has been checked during the site visit. The summary of calibration of meters is as follows:

11 The electricity export of "845 MWh" is after applying correction factor to the main meter and check meter readings and choosing the minimum of the two values for each month. The actual electricity import based on the main meter and check meter before applying the correction factor is 767 MWh and 833 MWh respectively.

Main Meter

Serial Number	Accuracy Class	Calibration frequency	Calibration Date	Correction Factor applied (due to delayed calibration)
080695 (Loop A)	0.23%	Annually	15/05/2009 11/05/2010 09/05/2011	14.04.2009 to 14.05.2009
080671 (Loop B)	0.23%	Annually	15/05/2009 11/05/2010 09/05/2011	14.04.2009 to 14.05.2009

Check Meter

Serial Number	Accuracy Class	Calibration frequency	Calibration Date	Correction Factor applied (due to delayed calibration)
27D616149423 (Pressure Valve)	0.25% of span	Annually	05/07/2009 05/07/2010 11/04/2011	14/04/2009 – 04/07/2009 12/04/2011 – 13/04/2011
CZD705229 (Temperature valve)	0.1% of span	Annually	05/07/2009 05/07/2010 11/04/2011	14/04/2009 – 04/07/2009 12/04/2011 – 13/04/2011

PP has calculated the "NG consumed in the project activity" based on both the main meter and check meter. The maximum value between the two values has been chosen on conservative basis for the calculation of emission reduction calculations. The natural gas consumption is 704961485[12] SCM during the monitoring period which has been used for the emission reduction calculations.

NCV of the Natural Gas consumed in the project activity:

The GCV of the natural gas is measured on daily basis by the Gas supplier using online Gas chromatograph installed by GAIL at their terminal. As the calorific value is reported in GCV, the NCV has been calculated using GCV and delta factor of 10% (CEA CO_2 baseline database for Indian Power Sector, Version 6, Assumptions worksheet, Cell F8) which is in line with the registered VCS PD. Based on the daily NCV (provided twice in a month depending on number of days) weighted average value of NCV has been used in the ER calculations.

The calibration frequency is once in a year for Gas chromatograph . The calibration certificates /19/ for the Gas chromatograph have been checked during the site visit. The summary of calibration of meters is as follows:

Main Meter:

Serial Number	Accuracy Class	Calibration frequency	Calibration Date	Correction Factor applied (due to delayed calibration)
9007310	17 kcal/SCM	Annually	10/08/2009 10/08/2010 22/02/2011	14/04/2009 to 09/08/2009 23/02/2011 to 13/04/2011

12 The gas consumption of "704961485 SCM" is after applying correction factor to the main meter and check meter readings and choosing the maximum of the two values for each month. The actual gas consumption based on the main meter and check meter before applying the correction factor is 690842956 SCM and 718291857 SCM respectively.

Check Meter

Serial Number	Accuracy Class	Calibration frequency	Calibration Date	Correction Factor applied (due to delayed calibration)
719668	17 kcal/SCM	Annually	1. 09.07.2009 2. 08.10.2009 3. 07.01.2010 4. 07.04.2010 5. 07.07.2010 6. 07.10.2010 7. 05.01.2011	No correction factor required

The weighted average Net Calorific Value (NCV) for the duration during the monitoring period is as follows:

Year 2009 (14th April to 30th June)	0.034 GJ/SCM
Year 2009 (1st July to 31st December)	0.034 GJ/SCM
Year 2010 (1st Jan to 31st December)	0.034 GJ/SCM
Year 2011 (1st January to 13th April)	0.036 GJ/SCM

Quantity of LNG consumed in the project activity, FC_{LNG} SCM:
The LNG supplied to the plant is measured on daily basis by the gas flow meters installed at the Gas supplier terminal of GAIL at the project site by the Gas supplier. The gas consumption is measured through two loops i.e Loop A and Loop B. The readings have been sourced from the GAIL Invoices which is a third party (gas supplier) calculated value. The Ultrasonic-Flow Meters (USM) meters are of Daniel make and have an accuracy class of 0.23%.

PP has also installed check meters at their end to cross check the quantity of natural gas. The meters are of Yokogawa make and have accuracy class of 0.25% of span and 0.1% of span respectively.

The calibration is done once in a year for all the Gas flow meters. The calibration certificates /18/ for the main meter and check meter has been checked during the site visit. The summary of calibration of meters is as follows:

Main Meter

Serial Number	Accuracy Class	Calibration frequency	Calibration Date	Correction Factor applied (due to delayed calibration)
080695 (Loop A)	0.23%	Annually	15/05/2009 11/05/2010 09/05/2011	14.04.2009 to 14.05.2009
080671	0.23%	Annually	15/05/2009	14.04.2009 to 14.05.2009

(Loop B)			11/05/2010 09/05/2011	

Check Meter

Serial Number	Accuracy Class	Calibration frequency	Calibration Date	Correction Factor applied (due to delayed calibration)
27D616149423 (Pressure Valve)	0.25% of span	Annually	05/07/2009 05/07/2010 11/04/2011	14/04/2009 – 04/07/2009 12/04/2011 – 13/04/2011
CZD705229 (Temperature valve)	0.1% of span	Annually	05/07/2009 05/07/2010 11/04/2011	14/04/2009 – 04/07/2009 12/04/2011 – 13/04/2011

The LNG consumption is 598.78 TJ during the monitoring period which has been used for the emission reduction calculations.

NCV of the LNG Gas consumed in the project activity:
The GCV of the LNG is measured on daily basis by the gas supplier using the online chromatograph installed by GAIL at their terminal. Further PP has also installed Check meters at their terminal for cross checking purposes. The gas supplier provides the value of GCV in fortnightly joint ticket readings. The NCV is calculated based on the GCV using the delta factor. Based on the daily NCV (provided twice in a month depending on number of days) weighted average value of NCV has been used in the ER calculations. As the calorific value is reported in GCV, the NCV has been calculated using GCV and delta factor of 10% (CEA CO_2 baseline database for Indian Power Sector, Version 8).

The calibration frequency is once in a year for all the meters. The calibration certificates /19/ for the meters have been checked during the site visit. The summary of calibration of meters is as follows:

Meter:

Serial Number	Accuracy Class	Calibration frequency	Calibration Date	Correction Factor applied (due to delayed calibration)
9007310	17 kcal/SCM	Annually	10/08/2009 10/08/2010 22/02/2011	14/04/2009 to 09/08/2009 23/02/2011 to 13/04/2011

Build Margin emission factor of Southern grid, $EF_{BM\ ,\ y}$: The value has been sourced from the database developed by Central Electricity Authority (CO_2 Baseline database for the Indian power sector, Version 8.0). The database is Government of India's official publication based on the 'Tool to calculate the emission factor for an electricity system'. The value of Build margin is 852.19 tCO_2/GWh.

CO_2 emission coefficient of fuel (Natural gas), $COEF_{f,y}$: The parameter is a calculated parameter based on the "Net Calorific Value of Natural Gas", "Emission factor of the Natural gas" and "Oxidation factor". The following formula has been used for the calculation of $COEF_{f,y}$:

$COEF_{f,y} = NCV_{f,\ y} * EF_{CO2,\ f,y} * OXID_f$

The value for this parameter for the complete monitoring period from 14th April 2009 to 13th April 2011 is as follows:

Year 2009 (14th April to 31st December)	0.003840610tCO_2/m^3
Year 2010 (1st January to 31st December)	0.003878346 tCO_2/m^3
Year 2011 (1st January to 13th April)	0.002026330 tCO_2/m^3

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Emission factor for upstream fugitive methane emissions occurring in the absence of the project activity, $EF_{BL,upstream,CH4}$: The value calculated for the parameter is 19.7 tCO_2/MU.

Project emission under project activity.PE_y: The project emissions calculated for the project activity (for the current monitoring period) based on the consumption of Natural gas and CO_2 emission coefficient of Natural gas comes out as 13,69,282 tCO_2.

4.3 Quality of Evidence to Determine GHG Emission Reductions or Removals

The main data required for emission reduction calculations is the "Quantity of Natural Gas consumed in the project activity", Net Calorific Value of the Natural Gas", "Net Electricity exported to the Southern grid of India", "Build Margin emission factor for Southern grid of India".

The Quantity of Natural Gas has been sourced from the fortnightly Joint Ticket Readings received from GAIL. This is based on the monitored values from calibrated flow meters (main meter and check meter) located at the plant site at GAIL terminal. The check meter has been installed at PP side has been used to cross check the Gas consumption readings.

The calibration frequency of the Gas flow main meter (annually) was not completely followed during the monitoring period. Due to delayed calibration of the Gas flow main meter /18/, PP has applied the maximum applicable error i.e. accuracy of main meter (0.23%) in line with the EB's latest guidance – "Guidelines for assessing compliance with the calibration frequency requirements, version 01" EB 52 Annex-60 /21/.

The calibration frequency of the Gas flow check meter (annually) was not completely followed during the monitoring period. Due to delayed calibration of the Gas flow check meter, PP has applied the maximum applicable error i.e. accuracy of check meter (0.25%) in line with the EB's latest guidance – "Guidelines for assessing compliance with the calibration frequency requirements, version 01" EB 52 Annex-60 /21/.

After applying the correction factor, PP has chosen maximum value between the main meter and check meter values for each month on a conservative basis for the calculation of emission reductions. For details, refer the submitted emission reduction estimation sheet.

The calibration frequency of the Net Calorific Value (NCV) of Natural Gas flow meter (annually) was not completely followed during the monitoring period. Due to delayed calibration of the Gas Chromatograph /19/, PP has applied the maximum applicable error i.e. accuracy of meters (17 kCal/SCM) in line with the EB's latest guidance – "Guidelines for assessing compliance with the calibration frequency requirements, version 01" EB 52 Annex-60 /21/. The values obtained are from a third party source and hence found appropriate. For details, refer the submitted emission reduction estimation sheet.

The calibration frequency of the Electricity meters (once in six months) was not completely followed during the monitoring period. Due to delayed calibration of the electricity meters /17/, PP has applied the maximum applicable error i.e. accuracy of meters (0.2%) in line with the EB's latest guidance – "Guidelines for assessing compliance with the calibration frequency requirements, version 01" EB 52 Annex-60 /21/. The correction factor of 0.2% to the export, import and net electricity exported values has been applied.

After applying the correction factor, PP has chosen minimum value between the main meter and check meter values for each month on a conservative basis for the calculation of emission reductions. For details, refer the submitted emission reduction estimation sheet.

The Build Margin emission factor for Southern grid of India has been calculated based on the latest CEA CO_2 Baseline Database, version 08; available at the submission of documents for Verification. The value of 852.19 tCO_2/GWh for the parameter is found appropriate.

Baseline Emissions: It is the product of net electricity supplied to the grid and Build emission factor of the Southern regional grid of India. Based on the above two figures (for the net electricity export and grid emission factor), the baseline emissions for the current verification period has been calculated to be 2866095 tCO_2

Project Emissions: The project emissions has been calculated as the product of total volume of natural gas combusted in the project plant and CO_2 emission coefficient for fuel. The project emissions has been calculated 1369282 tCO_2.

Leakage Emissions: This includes Leakage emissions due to fugitive upstream CH_4 emissions with Natural gas and emissions resulting from fuel extraction, processing, liquefaction, transportation, re-gasification and distribution of fossil fuels outside of the project boundary. This includes mainly fugitive CH_4 emissions and CO_2 emissions from associated fuel combustion and flaring.
CO_2 emissions from fuel combustion/electricity consumption associated with liquefaction, transportation, re-gasification and compression of LNG into a natural gas transmission or distribution system. The leakage emissions have been calculated as 88951 tCO_2

The emission reductions calculated for the monitoring period are 1407860 tCO_2.

4.4 Management and Operational System

The key responsibility of the project activity lies with the project proponent. A project team consisting of General Manager, Electrical Engineer, Operators and Operation & Maintenance Contractor was responsible for monitoring of project activity. The project team has been entrusted with the responsibility of storing, recording the data related to the project activity. The project team is also responsible for calculation of actual creditable emission reduction in the most transparent and relevant manner. Installed meters are calibrated according to the maintenance schedule programmed at the start of the operation and recalibrated according the plants performance requirement

The individual plants record data related to their respective project activity. The natural gas based power project abides by all regulatory and statutory requirements as prescribed under the state and central laws and regulations.
All the monitoring data is stored, recorded and kept under safe custody of the Project Executor and Head (Power Plant and Utilities) at the plant site for a period of crediting period + 2 years. The data is achieved in both hard copies and electronic format (excel sheets). Also, any change within the project boundary, such as change in spare and or equipment is recorded and any change in the emission reduction due to such alteration is studied and recorded. Thus it can be confirmed that the management system for the CDM project is in place; with the responsibilities appropriately identified.

5 VERIFICATION CONCLUSION

PJRCES has performed the verification of the emission reductions reported for the VCS project: "Combined cycle natural gas based grid connected power plant at Jegurupadu, India" in "India" during the period from 14/04/2009 to 13/04/2011*.The project is a registered VCS project with VCS.*

The project participant is responsible for collection of data and reporting the GHG emission reductions on the basis set out within the project's monitoring plan in the registered VCS PD dated 31st March 2011, version 04 and the applied methodology AM0029, version 03.

PJRCES's responsibility is to express an independent verification/certification statement for the emission reductions reported for the project for the period 14/04/2009 to 13/04/2011*.*

PJRCES's verification approach basically included the desk review of the project design (as stated in the registered VCS PD, ver04 and dated 31st March 2011); monitoring report version 01 dated 15th September 2011; approved baseline and monitoring methodology AM0029, version 03, site verification of the reported emission reductions and resolution of outstanding issues and issuance of final verification report. PJRCES also requested for the evidences, relevant information and explanations that were considered necessary to give a reasonable assurance of the reported emission reductions during the period from 14/04/2009 to 13/04/2011.

In PJRCES's opinion, the GHG emission reductions for "Combined cycle natural gas based grid connected power plant at Jegurupadu, India for the period from 14/04/2009 to 13/04/2011 are fairly stated in the monitoring report, version 3.3, dated 19th June 2013. The GHG emissions were calculated correctly on the basis of approved baseline and monitoring methodology AM0029, version 03 and the monitoring plan as included in the registered VCS PD, dated 31st March 2011, version 04.

Based on the information provided, verified and evaluated, PJRCES is able to certify the following statement:

Reporting period: From 14/04/2009 to 13/04/2011

Verified GHG emission reductions or removals in the above reporting period:

GHG Emission Reductions or Removals	tCO_2e
Baseline Emissions	*28,66,095*
Project Emissions	*13,69,282*
Leakage	*88,951*
Net GHG emission reductions or removals	*14,07,860*

Total Year-Wise emission reductions:

Period	***Emission Reductions (tCO_2e)***
14th April 2009 to 31st December 2009	*5,88,758*
1st January 2010 – 31st December 2010	*6,95,160*
1st January 2011 – 31st March 2011	*1,23,942*
14th April 2009 – 31st March 2011	**14,07,860**

Project Manager
PJRCES

Site Program Manager
PJRCES

APPENDIX-1

1. REFERENCES

Type 1: Documents that are related directly to the emission reductions verified during verification period under consideration:

S.No.	Type of document.
/1/	Monitoring report for the period 14/04/2009 to 13/04/2011 dated 17/08/2011, ver01 Revised Monitoring Report including ver02, 03, 3.1 and ver3.3 dated 19/06/2013 submitted by GVK Industries Ltd.
/2/	Emission Reductions spreadsheet for the period 14/04/2009 to 13/04/2011 dated 17/08/2011, ver01 Revised Emission reductions excel sheet ver3.3 dated 19/06/2013 submitted by GVK Industries Ltd.
/3/	Registered VCS project description document (PD) dated 31st March 2011, version 04, the monitoring plan as described in the registered VCS PD.
/4/	Final Validation Report dated 11/04/2011 version 01 prepared by PJRCES Inc.

Type 2: Documents used as background documents to verify the project's baseline, design or the methodology used to calculate emission reductions.

S.No.	Type of document.
/5/	O & M Agreement between GVK Industries Ltd & GVK Energy Ltd dated 1 November 2010
/6/	Power Purchase Agreement(PPA) between Transmission Corporation of A.P. and GVK Inds Ltd dated 18 June 2003
/7/	Letter from Andhra Pradesh Power Co-ordination Committee(APPCC) regarding Commercial Operation date(COD) dated 13 May 2009
/8/	Table 1.4, Chapter 1, Volume 2, 2006 IPCC Guidelines for National Greenhouse Gas Inventories
/9/	Baseline methodology for "Grid connected Electricity Generation plants using Natural Gas" AM0029 version 03 EB 39
/10/	Joint Meter Readings for the Electricity export, Electricity import and Net electricity supplied to the grid during the monitoring period (14/04/2009 to 13/04/2011).

/11/	Fortnightly Joint Ticket Readings for the Natural Gas received from GAIL during the monitoring period (14/04/2009 to 13/04/2011).
/12/	Fortnightly Joint Ticket Readings for the Gross Calorific Value of Natural Gas received from GAIL during the monitoring period (14/04/2009 to 13/04/2011).
/13/	Fortnightly Joint Ticket Readings for the LNG received from GAIL during the monitoring period (14/04/2009 to 13/04/2011).
/14/	Fortnightly Joint Ticket Readings for the Gross Calorific Value of LNG received from GAIL during the monitoring period (14/04/2009 to 13/04/2011).
/35/	CO_2 Baseline Database for the Indian Power Sector, version 05, Central Electricity Authority: http://www.cea.nic.in/reports/planning/cdm_co2/database_publishing_ver5.zip CO_2 Baseline Database for the Indian Power Sector, version 06, Central Electricity Authority: http://www.cea.nic.in/reports/planning/cdm_co2/Database_publishing_ver6.zip CO_2 Baseline Database for the Indian Power Sector, version 07, Central Electricity Authority: http://www.cea.nic.in/reports/planning/cdm_co2/database_7.zip CO_2 Baseline Database for the Indian Power Sector, version 07, Central Electricity Authority: http://www.cea.nic.in/reports/planning/cdm_co2/user_guide_ver8.pdf
/46/	Invoices raised by GVK to APTRANSCO for the electricty supplied to the Grid for the monitoring period 14/04/2009 to 13/04/2011.
/17/	Calibration Certificates of the Electricity meters installed under the project activity for the monitoring period (14/04/2009 to 13/04/2011).
/18/	Calibration Certificates of the Gas Flow meters installed under the project activity for the monitoring period (14/04/2009 to 13/04/2011).
/19/	Calibration Certificates of the Gas Chromatographs installed under the project activity for the monitoring period (14/04/2009 to 13/04/2011).
/20/	Minutes of Meeting of VCS Audit Team dated 11/01/2010.
/21/	Guidelines for assessing compliance with the calibration frequency requirements (EB 52 Annex 60).
/22/	VCS Standard version 3.3 http://v-c-s.org/sites/v-c-s.org/files/VCS%20Standard%2C%20v3.3.pdf VCS Standard version 2007.1
/23/	Site visit carried out for the project activity on 24/11/2011 and 25/11/2011.

APPENDIX-2

RESOLUTION OF VERIFICATION CORRECTIVE ACTION REQUESTS AND CLARIFICATION REQUESTS: - COMBINED CYCLE NATURAL GAS BASED GRID CONNECTED POWER PLANT AT JEGURUPADU, INDIA

Draft report clarification requests and corrective action requests by verification team	Reference	Summary of project owner response	Verification team conclusion
CL#01 The following issues have been identified in the Monitoring Report (MR) as per the PD filling guidelines available in the "VCS monitoring report template v3.0" on the VCS website.			
1. PP is requested to use the latest VCS Monitoring Report template available on the VCS website.	Monitoring Report	1. PP has used the latest VCS monitoring report template available on the VCS website.	1. PP has still not used the latest version of monitoring report template. Please clarify.
2. Please indicate the project type and clarify whether the project is a grouped project under Section 1.2 of the MR.		2. PP has now mentioned the required information under section 1.2 of the MR.	2. Verification team has reviewed the revised MR. PP has now specified the Type as "Low carbon intensity" which is cross checked against " http://cdm.unfccc.int/methodologies/documentation/meth_booklet.pdf#AM0029" and found to be correct. Also, it is now clarified that the project is not a grouped. The same was confirmed during the site visit and hence, Issue is now closed.
3. PP is requested to maintain the format of the template and follow the same religiously.		3. PP has now maintained the same format of the template as per the Instructions for completing the project description given in the template.	3. Revised MR has been reviewed and PP has still not followed the MR filling guidance. Please clarify.
4. PP is requested to respond to the comments made in the MR and		4. PP has now responded to all the comments made in the MR and	4. PP has removed all the comments from MR. Please check.

Draft report clarification requests and corrective action requests by verification team	Reference	Summary of project owner response	Verification team conclusion
provide response against the comment itself. 5. Please provide the roles and responsibilities of the project proponent in Section 1.3 of the MR.		responded against the comment itself. 5. PP has now provided the roles and responsibility of the project proponent in Section 1.3 of the MR.	5. In the section 1.3 of revised MR, roles and responsibilities have been clearly stated. It is stated that PP itself is controller and responsible for the project activity and sole owner of the VCUs generated. It is also mentioned that PP is also responsible for the verification activity and providing necessary documentation during verification. The same was found to be consistent with the validated PD section 1.15 and 3.4 and hence, issue is now closed.
CL#01.1 1. PP has still not used the latest version of monitoring report template. Please clarify. 3. Revised MR has been reviewed and PP has still not followed the MR filling guidance. Please clarify. 4. PP has removed all the comments from MR. Please check.		1. Latest template version 3.2 has now been used. (Monitoring report v3.2 October 2012). 3. MR filling guidance is now followed. 4. All the comments are now maintained in MR.	1. The latest version of the monitoring report template has now been used. The issue is closed. 3. MR has now been filled as per the monitoring report filling guidance. The issue is closed. 4. PP has now retained all the comments and provided reply to all the comments and the issue is closed.
CL#02 PP has provided details on the shut down period under Section 2.1 of the MR. PP is	Section 2.1	Clarification is now given for shutdown period under Section 2.1 of the MR.	Verification team has reviewed the revised MR section2.1 for the shutdown

Draft report clarification requests and corrective action requests by verification team	Reference	Summary of project owner response	Verification team conclusion
further requested to clarify the reasons for each shut down period and also submit the supporting documents to support the claim.		Supporting documents for each shutdown period is submitted.	period and reasons for the same. it is to be noted that plant was shut down due to various reasons such as rectification of ST generator, Grid supply disruption, scheduled inspections, etc. the reasons and the periods during which plant was shut down as given in the MR are cross checked against the Status of Plant operation submitted to APTRANSCO for respective days and was found to be consistent. Thus, issue is now closed.
CL#03 The following issues have been identified with respect to the "Data and parameters available at Validation" mentioned in Section 3.1 of the MR. 1. $EF_{BL,upstream,CH4}$: The value considered during the monitoring period is 15.94 tCO_2/MU while the value of the parameter is 16.16 tCO_2/GWh as per the validated VCS PD. Please clarify. 2. PP has provided 4 parameters under the section 3.1 of MR. However parameter 1 & 2 are not available as parameters available at validation in the validated PD. Parameter 3 & 4 are included in the section 3.3 i.e. Data	Section 3.1	1. PP has considered the CEA database version no. 5 in the VCS PD which was the latest CEA version available at that time while PP has used the CEA database version no. 6 while submitting the Monitoring report and the VER calculation sheet. There were lot of changes happened in the database and hence the value is varying in the PDD and in the latest submitted sheet. 2. PP has now removed the Parameter 1 & 2 from the section 3.1 and Parameter 4 from the section 3.2 of the MR. Parameter 3 is of section 3.2 is already mentioned in the registered PDD.	1. Verification team has reviewed the revised MR section 3.2 and compared the same with validated PD section 3.3. It is inconclusive from both the documents whether the parameter is fixed ex-ante or monitored. PP to clarify. Also, the revised MR is inconclusive as to how the value of "**$EF_{BL,upstream,CH4}$**" is determined. The source of data mentioned in the response is not consistent with the revised MR & validated PD. Please clarify. 2. In the revised MR section 3.1 PP has now removed the parameters "**$EF_{NG,upstream,CH4}$**" and "**$EF_{CO2,upstream,LNG}$**". PP shifted the parameter "**$EF_{BM,y}$**" from section 3.2 to 3.1 in the

Draft report clarification requests and corrective action requests by verification team	Reference	Summary of project owner response	Verification team conclusion
and parameters monitored. Please clarify.		Hence PP has now maintained the consistency in the MR and in the PDD.	revised MR and hence, clarify. Parameter "**$FC_{LNG,y}$**" is correctly included in section 3.2 of the revised MR. PP has now removed the parameter "**$EF_{CO2,f,y}$**" from revised MR and hence, PP to clarify. Furthermore, PP to update cross referencing of parameters within the MR. Please check and clarify.
3. Further PP has not justified selection of default values.		3. PP has now justified the selection of default vales in the section 3.1 of the revised PD.	3. Verification team has reviewed the revised MR. the section 3.1 is still incomplete with respect to data and parameters available at the time of validation and hence, please clarify.
4. $EF_{CO2,f,y}$: PP has not clarified the fuel for which emission factor has been considered. PP has stated that "As IPCC emission factors are updated, conservative value will be chosen" Please clarify.		4. PP has now included the fuel name in the section 3.1 PP has stated that "As IPCC emission factors are updated, conservative value will be chosen". This sentence states that If the IPCC emission factor has been updated in future then the conservative value has been chosen for the calculation. In this case the IPCC emission factor has not been revised yet and hence it will remain as per the registered PDD.	4. No such justification is found for parameter "$EF_{CO2,f,y}$" in the revised MR. Please clarify.
5. As per Section 4.2 of the validated PD, it is mentioned that "In case of Build Margin and Operating margin, the grid		5. In case of the build margin and operating margin, the grid emission factor available at the time of the	5. PP provided the parameter "$EF_{BM,y}$" under section 3.1. Clarify how the same is in-line with the validated

Draft report clarification requests and corrective action requests by verification team	Reference	Summary of project owner response	Verification team conclusion
emission factors available at the time of PDD webhosting for global stakeholder comments and the validators site visit is used". Please clarify on the same.		validators site visit is used.	PD. Also, the justification for source is in adequate to conclude the value used by PP is appropriate in the context of the project activity. Please clarify.
CL#03.1 1. Verification team has reviewed the revised MR section 3.2 and compared the same with validated PD section 3.3. It is inconclusive from both the documents whether the parameter is fixed ex-ante or monitored. PP to clarify. Also, the revised MR is inconclusive as to how the value of "$\mathbf{EF_{BL,upstream,CH4}}$" is determined. The source of data mentioned in the response is not consistent with the revised MR and validated PD. Please clarify. 2. In the revised MR section 3.1 PP has now removed the parameters "$\mathbf{EF_{NG,upstream,CH4}}$" and		1. According to AM0029 "If EFBL,upstream,CH4 is determined based on the build margin or the combined margin, the calculation should be consistent with the calculation of CO2 emissions in the build margin and the combined margin, i.e. the same cohort of plants and data on fuel combustion and electricity generation should be used, and the values for FF and EG should be those already determined through the application of "Tool to calculate emission factor for an electricity system". As PP is doing the ex post calculation for build margin EF and EG is also determined considering the same Cohort of plants. Hence PP is using CEA database version no.6 (latest available at the time of submission of verification document) for both build margin and for the calculation of "$\mathbf{EF_{BL,upstream,CH4}}$" . 2. Parameters like "$\mathbf{EF_{NG,upstream,CH4}}$" and "$\mathbf{EF_{CO2,upstream,LNG}}$" are now correctly added in section 3.1. "$\mathbf{EF_{BM\ ,\ y}}$" is now	1 . The parameter shall be monitored as per the registered VCS PD. Hence the version 05 of the CEA database was used at the time of Validation and hence in the registered VCS PD. PP has now used version 06 of the CEA database for the calculation of emission factor, which was applicable at the time of submission of the documents to the DOE. Hence the justification provided by the PP is acceptable and hence the issue is closed. The issue is now closed. 2. PP has now correctly included the parameter $\mathbf{EF_{NG,upstream,CH4}}$" and

Draft report clarification requests and corrective action requests by verification team	Reference	Summary of project owner response	Verification team conclusion
"**$EF_{CO2,upstream,LNG}$**". PP shifted the parameter "**$EF_{BM\ ,\ y}$**" from section 3.2 to 3.1 in the revised MR and hence, clarify. Parameter "**$FC_{LNG,y}$**" is correctly included in section 3.2 of the revised MR. PP has now removed the parameter "**$EF_{CO2,f,y}$**" from revised MR and hence, PP to clarify. Furthermore, PP to update cross referencing of parameters within the MR. Please check and clarify.		mentioned in section 3.2 in revised MR. Parameter "**$EF_{CO2,f,y}$**" is now "EF_{CO2NG}" and is present in section 3.1 of revised MR.	"**$EF_{CO2,upstream,LNG}$**" under the Section 3.1 of the revised Monitoring Report. PP has now correctly shifted the parameter "**$EF_{BM\ ,\ y}$**" to Section 3.1 of the revised Monitoring Report. The parameter" **$FC_{LNG,y}$**" has now been correctly included under Section 3.2 of the revised Monitoring Report. The issues are closed.
3. Verification team has reviewed the revised MR. the section 3.1 is still incomplete with respect to data and parameters available at the time of validation and hence please clarify..		3. All the required Parameters are now available in MR which is also in line with PD.	3. PP has now included all the required parameters in line with the applied methodology and the registered VCS PD. The issue is closed.
4. No such justification is found for parameter "$EF_{CO2,f,y}$" in the revised MR. Please clarify.		4. PP has now clarified in the monitoring report that the fuel used is natural gas and according the notation of the parameter is corrected. Instead of $EF_{CO2,f,y}$ PP has used $EF_{CO2\ NG}$.	4. PP has now revised the notation for the emission factor of the natural gas under Section 3.1 of the revised Monitoring report and hence the issue is closed.
5. PP provided the parameter "$EF_{BM\ ,\ y}$" under section 3.1. Clarify how the same is in-line with the validated PD. Also, the justification for source is in adequate to conclude the value used by PP is appropriate in the context of the project activity.		5. Refer to above response 1 of CL 03.	5.The parameter "$EF_{BM\ ,\ y}$" is a monitored parameter and hence have been put in the Section 3.2 of the Monitoring Report which is acceptable and in line with the registered VCS PD. The issue is closed.

Draft report clarification requests and corrective action requests by verification team	Reference	Summary of project owner response	Verification team conclusion
CL#04 The following issues have been identified with respect to the monitoring parameters defined in the Section 3.2 of the monitoring report.	Section 3.2		
a. $FC_{f,y}$ (Quantity of fuel consumed in the project activity, Parameter 1): 1. PP is requested to submit the copies of "plant log book" based on which the emission reduction calculations has been estimated.		a. 1. PP has submitted the sample copies of log book. It is not possible to give all the sheets as the number of sheet is large	a. $FC_{f,y}$ (Quantity of fuel consumed in the project activity, Parameter 1): 1. Verification team has reviewed the supporting plant log books submitted by PP. It is observed that PP has submitted the all the plant log book data and hence, verification team fails to understand the response provided by PP. Please clarify.
2. Further the main meter and check meters shows different values and hence please clarify how the "Emergency procedures" in the monitoring report has been followed in line with the description provided in Section 3.3 of the validated VCS PD.		2. As per the monitoring plan, the main meter reading will be used for calculations. If main meter shows error beyond permissible range then check meter readings will be used. Emergency procedures are required only if both the meters show error beyond permissible limits. Thus, different values of main meter and check meter readings do not require going for emergency procedures.	2. Verification team did not find any such description in the validated PD for the measurement using gas flow meters. Please clarify.
3. PP is requested to mention the correct meter numbers and identify the meters installed at supplier end and project		3. The correct meter numbers installed at supplier end and project end are provided in Annexure-1 of PDD.	3. Revised MR, Annexure 1 has been reviewed by verification team. The meter numbers provided in the revised MR were verified during the

Draft report clarification requests and corrective action requests by verification team	Reference	Summary of project owner response	Verification team conclusion
end separately.			site visit and also, found to be consistent with the calibration reports submitted. However, the meter numbers used prior to 19/08/2009 are not clarified in the Annexure I. Please check.
4. As per the applied methodology the fuel consumption data at project end shall be used for cross verification of the gas consumption data generated at the supplier end, however the same is not indicated in the MR. Please also submit the data generated at the project end.		4. The fuel consumption data generated at supplier end is cross verified with check meter readings at Project end as mentioned in parameter1 of section 3.2.	4. Response is indistinct. Also, the response provided is not consistent with the MR. PP to explicitly explain as to how the invoices obtained from the Gas supplier are used for cross verification of the fuel consumption data. No response provided for submission of data generated at project end. Please check and clarify.
5. PP is also requested to provide the calibration details of the meters prior to 19/08/2009.		5. The calibration details are provided in Annexure-1 of PDD.	5. Verification team has reviewed the Annexure I and PP has not provided details on the calibration of the meters used prior to 19/08/2009. Please clarify.
6. Accuracy class of the meters is not specified in the MR.		6. Accuracy class of flow meter and energy meter is now given in PDD.	6. Accuracy class of flow meter for parameter "$\mathbf{FC_{f,y}}$" is now specified. However, the same is not available in the validated PD. Please clarify.
7. The accuracy class of meters is 0.2%		7. The accuracy class mentioned in	7. The 2% on page38 of VCS PD is error margin and not the accuracy

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on page number 33 in the Section 3.3 of the validated VCS PD and 2% on page number 38 in the Section 3.4 of the validated PD. Please clarify.		page 38 is for the flow meter installed in GAIL terminal while the accuracy class of meters on page number 33 in the Section 3.3 is for energy meters.	class. PP is requested to clarify.
8. The data for the "December" month has not been mentioned in the table. Please clarify.		8. The table is now revised and it shows the data for December.	8. For all the parameters the data table is now corrected to reflect the period up-to 31/12/2009 for the year 2009 and hence, issue is now closed.
9. As per the "QA/QC Procedures" in Section3.4 of the validated PD, the GAIL flow meters shall be calibrated as per the standards of AGA-9/10. PP is requested to clarify how the project complies with the above requirement.		9. The calibrations were done by GAIL as per the agreement between PP and GAIL, which follows the standards of AGA-9/10. However the standard is not available with PP.	9. PP is requested to submit the copy of the agreement with GAIL. Please clarify.
b. $EG_{PJ,y}$ (Net electricity exported by the plant, Parameter6):		b.	b. $EG_{PJ,y}$ (Net electricity exported by the plant, now **Parameter5**):
1. The source of data considered for the parameter is "Plant log book". PP is requested to submit copy of log books based on which the emission reduction calculations have been estimated. 2. The data for the December month has not been provided in the table. Please clarify.		1. PP has submitted the sample copies of log book. It is not possible to give all the sheets as the number of sheet is large 2. The table is now revised and it shows the data for December	1. Response is not acceptable. PP is requested to submit the supporting documents for entire monitoring period. 2. In the revised MR, PP has corrected the parameter box to reflect the period up-to & including 31 December 2009. The value of the net export remains unchanged and matched with the actual value of net electricity export as verified from ER calculation sheet and hence, issue is now closed.

Draft report clarification requests and corrective action requests by verification team	Reference	Summary of project owner response	Verification team conclusion
c. $NCV_{f,y}$ (Net Calorific Value of Natural Gas, Parameter2): 1. GAIL invoices provide the GCV values and hence NCV shall be calculated using the GCV value and delta factor as per the validated VCS PD. However the same calculations are not traceable in the ER calculations excel sheet submitted to the DOE. Please clarify. 2. Also, as observed above, PP is requested to further clarify since, the procedure described in the validated PD and actual procedure followed at the site differs for calculating NCV from GCV. 3. Please mention the details of the previous calibration certificates (before 10/08/2009) for the Gas chromatograph meters. 4. As observed during site visit, there are four different sources for NCV. i. GAIL Logbooks: ii. Form#4.03 maintained by GAIL		c. 1. Calculations of NCV from GCV is now added in the excel sheet 2. The gas invoices provided by GAIL mentions GCV and NCV is calculated by using delta factor. The chromatograph installed by PP (check meter) provides the value of both GCV and NCV. However the methodology does not require the PP to cross check the NCV. For emission calculation, PP can use the values of NCV calculated from GCV provided in the GAIL invoices. 3. The calibration details are now provided in the Annexure-1 in PDD 4. The different sources of NCV is for internal purposes As mentioned in the point-2 above, the methodology does not require	c. $NCV_{f,y}$ (Net Calorific Value of Natural Gas, Parameter2): 1. No such calculation is found in the revised ER spreadsheet submitted by PP. Please clarify. 2. PP to clarify how the procedure mentioned in the validated PD is followed. Also, the calculation of NCV from GCV is neither traceable in revised MR nor in revised ER spreadsheet. Please clarify. 3. PP has now provided calibration details at two difference places in the revised MR. PP to ensure uniformity in the revised MR. Also, the calibration details covering entire monitoring period is still missing in the revised MR. Please clarify. 4. As per validated PD, the NCV is sourced from Invoice whereas in actual GCV is provided by the invoice. The conversion of GCV to

Draft report clarification requests and corrective action requests by verification team	Reference	Summary of project owner response	Verification team conclusion
iii. Invoice from GAIL: iv. PP logbook: Please clarify since, the logbook records are maintained for GCV from 00:00 hrs to 24:00 hrs and Form#4.03 and invoice of the GAIL provide values of NCV from 06:00 hrs to 06:00 hrs how the values of NCV can be cross verified? Also, PP logbooks records values from 00:00 hrs to 24:00 hrs.		the PP to cross check the NCV. For emission calculation, PP can use the values of NCV calculated from GCV provided in the GAIL invoices.	NCV is neither traceable in the revised MR nor in the ER spreadsheet submitted by PP. Please clarify.
5. PP has considered invoice from supplier as the source for NCV. Also, in the QA/QC it is mentioned that the NCV will be cross checked with invoice only. Please clarify.		5. The methodology does not require the PP to cross check the NCV.	5. As per validated PD PP is requested to clarify the cross checking of the GAIL invoice values with same document i.e. GAIL invoice.
d. $FC_{LNG,y}$: PP has stated that "The quantity of Liquefied Natural Gas is measured by the gas flow meter which would be installed by GAIL at their terminal" Please clarify.		d. LNG is supplied by the same pipeline which supplies Natural gas. Thus it can be measured only by GAIL in their terminal that how much quantity or proportion of LNG is being put in the pipeline	d. **$FC_{LNG,y}$**: No corrections have been made in the revised MR. The response is not relevant to the query raised. Please check
e. $EF_{BM,y}$: in both MR and validated PD PP had indicated the parameter would be used ex-ante, however in both the documents the same parameter is provided under the section of Data and parameters monitored and also indicated that the parameter would be monitored ex-post. Please clarify.		e. $EF_{BM,y}$ is now removed from the monitored parameters and mentioned in parameters available at the time of validation	e. $EF_{BM,y}$: PP has now shifted the parameter to Section 3.1 of the revised MR. Clarify how it is in-line with validated PD. PP to bring out the clarity for monitoring the parameter and clarify the procedure followed to calculate the same during the monitoring period.
f. $Oxid_{NG}$ (Oxidation factor of NG), $EF_{CO2,f,y}$ (Emission factor of Natural gas) and $FC_{f,FF,y}$ (Quantity of any other fossil fuel consumed in the project activity as start up or co-fired): As per		f. $FC_{f,FF,y}$ is not monitored because no other fossil fuel is used as start up fuel $Oxid_{NG}$ and $EF_{CO2,f,y}$ are sourced from 2006 IPCC Guidelines for	f. $Oxid_{NG}$ (Oxidation factor of NG), $EF_{CO2,f,y}$ (Emission factor of Natural gas) and $FC_{f,FF,y}$ (Quantity of any other fossil fuel consumed in the project activity as start up or co-

Draft report clarification requests and corrective action requests by verification team	Reference	Summary of project owner response	Verification team conclusion
the validated VCS PD, all the three parameters have been considered as the monitoring parameters however all the parameters have not been considered as monitoring parameter in the monitoring report. Please clarify.		National Greenhouse Gas Inventories which was not updated later. Hence, it is not considered as monitored parameters	fired): $Oxid_{NG}$ (Oxidation factor of NG): verification team has reviewed the response and cross verified the same with validated PD. The parameter is fixed for entire crediting period and hence, issue is now closed. $EF_{CO2,f,y}$ (Emission factor of Natural gas): As per the validated PD the parameter needs to be monitored. PP had used the IPCC value for ex-ante emission estimation purpose only. Please clarify. $FC_{f,FF,y}$ (Quantity of any other fossil fuel consumed in the project activity as start up or co-fired): it was verified during the site visit that no other fossil fuel have been used during the monitoring period and hence, issue is now closed.
g. $FC_{LNG,y}$ (Quantity of LNG consumed in the project activity): PP has also considered the consumption of LNG for the calculation of emission reductions. Please clarify how it is in line with the applied methodology for natural gas.		g. The methodology is applicable to grid connected power plants using natural gas. LNG which is partially used in project activity is also natural gas which differs only in method of extraction. Hence the emission related to LNG is calculated separately and is in line with the methodology.	g. $FC_{LNG,y}$ (Quantity of LNG consumed in the project activity): PP to clarify how the calculations and tables provided in section 4.3 of the revised MR is in complete conformance with validated PD and applied methodology.
h. As per the validated VCS PD, the operating margin has been calculated based on the simple average of the previous three years data (2006-07, 2007-08, 2008-09) however as per the		h. Operating margin is now calculated based on weighted average of the previous three year's data.	h. Verification team reviewed the revised ER spreadsheet and workbook "EF_BM". No corrections were found in-line with the responses provided. Please clarify.

Draft report clarification requests and corrective action requests by verification team	Reference	Summary of project owner response	Verification team conclusion
applied "Tool to calculate emission factor for an electricity system", the weighted average of the previous three years data shall be used for the calculation of operating margin. Please clarify.			
i. The details on the monitoring equipment and their calibration details have not been provided for the parameter - "LNG consumption (Parameter 3)", "Electricity exported by the project plant (Parameter6). Please also specify the accuracy class of the meters installed.		i. LNG is supplied by the same pipeline which supplies Natural gas. Thus it is not possible to measure LNG separately. However GAIL provides the data on quantity of LNG infused with Natural gas	i. Response does not answer the query raised for "LNG consumption". No response provided on details for the parameter "Electricity exported by project plant". The parameter box in the revised MR still does not provide any clarity in-line with the query.
j. The parameter ($FCf_{,FF,y}$ (quantity of any other fossil fuel consumed in the project activity as start up fuel or co-fired) is part of monitoring plan as per the validated VCS PD, however it has not been considered as monitoring parameter in the monitoring report.		j. No other fuel was consumed apart from natural gas. Therefore the parameter $FCf_{,FF,y}$ is not considered in monitoring parameter.	j. it was verified during the site visit that no other fossil fuel have been used during the monitoring period and hence, issue is now closed.
CL#04.1 a. $\underline{FC_{f,y}}$ <u>(Quantity of fuel consumed in the project activity, Parameter 1):</u> 1. Verification team has reviewed the supporting plant log books submitted by PP. It is observed that PP has submitted the all the plant log book data and hence, verification team fails to understand the response provided by PP. Clarification has been		1. PP has now modified the source of gas consumption which is mentioned in deviation section 2.2 of MR PP has now mentioned that the main source for gas consumption will be the Fortnightly Joint ticket received from GAIL,. The same will be cross checked by GAIL	1. PP has now revised the response for the issue raised by PJRCES. The data for this parameter has been sourced from the "primary source" which is fortnightly joint ticket which has been found correct. The same has been

Draft report clarification requests and corrective action requests by verification team	Reference	Summary of project owner response	Verification team conclusion
requested from the PP. Please clarify.		invoices.	cross checked with the help of Gas invoices. The issue is closed.
2. Verification team did not find any such description in the validated PD for the measurement using gas flow meters. Please clarify.		2.To avoid any fluctuation in project emissions due to discrepancy in main meter and check meter, higher of the two values is applied for project emission calculation. Thus no measurement procedures are required for gas flow meters. PP has not observed any error in the main meter during the entire monitoring period which can be seen from the calibration reports submitted to the DOE. PP has now given the split up according to Loop A and Loop B which gives the quantity of fuel supplied from the individual gas pipe line to the plant.	2.The justification provided by the PP is acceptable to the DOE. The issue is closed.
3. Revised MR, Annexure 1 has been reviewed by verification team. The meter numbers provided in the revised MR were verified during the site visit and also, found to be consistent with the calibration reports submitted. However, the meter numbers used prior to 19/08/2009 are not clarified in the Annexure I. Please check.		3.Revised summary table includes meter numbers prior to 19/08/2009.	3. PP has now revised the Callibration summary in the Annexure-1 of the revised Monitoring report. The revised summary includes the Calibration dates and details on the correction factor applied for the period for which the Calibration certificates are not available. The issue is closed.
4. Response is indistinct. Also, the response provided is not consistent with the MR. PP to explicitly explain as to how the invoices obtained from the Gas supplier are used for cross		4.PP has now modified the MR, deviation is explained in Section 2.2 of MR.Main source is JMR for fuel consumption and crosscheck of gas consumption will be done as per GAIL	4. PP has now explained all the deviations in the revised Monitoring report and the issue is closed.

Draft report clarification requests and corrective action requests by verification team	Reference	Summary of project owner response	Verification team conclusion
verification of the fuel consumption data. No response provided for submission of data generated at project end. Please check and clarify..		invoices.	
5. Verification team has reviewed the Annexure I and PP has not provided details on the calibration of the meters used prior to 19/08/2009. Please clarify.		5. Calibration details prior to 19/08/2009 is now made available in revised summary table.	5. The response provided by the PP is acceptable to the DOE. The issue is closed.
6. Accuracy class of flow meter for parameter "$FC_{f,y}$" is now specified. However, the same is not available in the validated PD. Please clarify.		6 In PD page no. 38 PP has mentioned error margin of 2% while the accuracy class for the gas flow meter was not mentioned in the PD. The accuracy class of 0.23% for gas flow meter is now included in the MR section 2.2 as well as in Annexure 1	6. The response provided by the PP is acceptable to the DOE. The issue is closed.
7. The 2% on page38 of VCS PD is error margin and not the accuracy class. PP is requested to clarify.		7. 2% is error margin and 0.23 % accuracy class is for gas flow meter mentioned in MR.	7. PP has now clarified on the error margin and accuracy class, hence the issue is closed.
9. PP is requested to submit the copy of the agreement with GAIL.		9. Copy of agreement with GAIL is now made available to PJR.	9. Copy of GAIL agreement has now been provided to the DOE. The issue is closed.
b. $EG_{PJ,y}$ (Net electricity exported by the		b. 1. As per PPA dated 18.06.2003 clause	b. 1.

Draft report clarification requests and corrective action requests by verification team	Reference	Summary of project owner response	Verification team conclusion
plant, now **Parameter5**): 1. Response is not acceptable. PP is requested to submit the supporting documents for entire monitoring period.		No.4.12. Monthly JMR is taken in presence of APTRANSCO representative which is the primary source for net electricity export (Including export and import). It will be cross checked with the invoices raised by GVK on APTransco. PP has also installed check meter at project site and. Conservative value has been used for the calculation of emission reduction. Deviation is given in 2.2 of MR.	PP has now provided the supporting document for the electricity generation data for the complete monitoring period. Further PP has also provided revised response to the issue raised which is acceptable to the DOE. The issue is closed.
c. $NCV_{f,y}$ (Net Calorific Value of Natural Gas, Parameter2): 1. No such calculation is found in the revised ER spreadsheet submitted by PP. Please clarify.		c. 1. Conversion of GCV to NCV is found in Gas consumption sheet of ER sheet.	c. 1. The conversion of GCV to NCV is available in the calculation sheet of the emission reduction calculation sheet. The issue is closed.
2. PP to clarify how the procedure mentioned in the validated PD is followed. Also, the calculation of NCV from GCV is neither traceable in revised MR nor in revised ER spreadsheet. Please clarify.		2. NCV is calculated by applying delta factor to GCV given, in GAIL invoices. It is evident in gas consumption sheet of Emission Reduction worksheet.	2. The explanation provided by the PP on the conversion from GCV to NCV is acceptable to the DOE. The issue is closed.
3. PP has now provided calibration details at two difference places in the revised MR. PP to ensure uniformity in the revised MR. Also, the calibration details covering entire monitoring period is still missing in the revised MR. Please clarify.		3. PP has now mentioned the calibration details at one place which will cover the entire monitoring period. Calibrations details are now mentioned at one place in the MR. Please refer annexure 1 of the revised monitoring report.	3. PP has now provided the Calibration details at one place in the AnnexureI of the revised Monitoring report and hence the issue is closed.

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4. As per validated PD, the NCV is sourced from Invoice whereas in actual GCV is provided by the invoice. The conversion of GCV to NCV is neither traceable in the revised MR nor in the ER spreadsheet submitted by PP. Please clarify.		4. PP has taken the GCV from forthnightly joint meter readings and on the basis of that by considering the delta factor PP has computed the NCV. As per methodology cross check source is not required for the NCVThis deviation is given in section 2.2 of MR.	4. The justification provided by the PP on the calculation of NCV from GCV is acceptable to the DOE. The issue is closed.
5. As per validated PD PP is requested to clarify the cross checking of the GAIL invoice values with same document i.e. GAIL invoice.		5. As per the modified MR PP has taken the GCV from forthnightly joint meter readings and on the basis of that by considering the delta factor PP has computed the NCV. As per methodology cross check source is not required for the NCV.	5. The justification provided by the PP on the calculation of NCV from GCV is acceptable to the DOE. The issue is closed.
d. **FC** $_{LNG,y}$: No corrections have been made in the revised MR. The response is not relevant to the query raised. Please check and clarify.		d. LNG is supplied by the same pipeline which supplies Natural gas. Thus it can be measured only by GAIL in their terminal that how much quantity or proportion of LNG is being put in the pipeline	d. Based on the site visit carried, the justification provided by the PP is acceptable to the DOE. The issue is closed.
e. $EF_{BM,y}$: PP has now shifted the parameter to Section 3.1 of the revised MR. Clarify how it is in-line with validated PD. PP to bring out the clarity for monitoring the parameter and clarify the procedure followed to calculate the same during the monitoring period.		e. PP has now shifted the parameter in MR section 3.2 as it is monitored parameter. According to AM0029 "If EFBL,upstream,CH4 is determined based on the build margin or the combined margin, the calculation should be consistent with the	e. PP has now shifted the parameter $EF_{BM,y}$ to the Section 3.2 of the revised Monitoring report and the procedure to determine the parameter has also been clarified and explained and hence the issue is closed.

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		calculation of CO2 emissions in the build margin and the combined margin, i.e. the same cohort of plants and data on fuel combustion and electricity generation should be used, and the values for FF and EG should be those already determined through the application of "Tool to calculate emission factor for an electricity system". As PP is doing the ex post calculation for build margin EF and EG is also determined considering the same Cohort of plants. Hence PP is using CEA database version no.6 (latest available at the time of submission of verification document) for both build margin and for the calculation of "**$EF_{BL,upstream,CH4}$**" .	
f. $EF_{CO2,f,y}$ (Emission factor of Natural gas): As per the validated PD the parameter needs to be monitored. PP had used the IPCC value for ex-ante emission estimation purpose only. Please clarify. g. $FC_{LNG,y}$ (Quantity of LNG consumed in the project activity): PP to clarify how the calculations and tables provided in section 4.3 of the revised MR is in complete conformance with validated PD and applied methodology.		f. The parameter $EF_{CO2,f,y}$ is same as EF_{CO2NG} and in the validated PD the value has been taken from IPCC default values . This is not a monitored parameter. g. LNG supply use to be monitored at the starting point of Gas supply. At project site there is no separate meter for measuring LNG consumption. Whatever LNG used by PP is mentioned in the GAIL invoice. As per the methodology PP has considered all the necessary leakage emission for calculating the emission reduction.	f. The justification provided by the PP is acceptable to the DOE. The issue is closed. g. PP has considered the leakage emission for the LNG consumption in the project activity. The calculations have been provided in the excelsheet. The issue is closed. h.

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h. Verification team reviewed the revised ER spreadsheet and workbook "EF_BM". No corrections were found in-line with the responses provided. i. Response does not answer the query raised for "LNG consumption". No response provided on details for the parameter "Electricity exported by project plant". The parameter box in the revised MR still does not provide any clarity in-line with the query.		h. PP has now corrected the combined margin, operating margin and build margin as per CEA database version 06. Operating margin is now calculated on the basis of weighted average as per the tool. i. PP has now provided the calibration details for energy export details. Accuracy class of the meter installed is now provided in the parameter details.	PP has now calculated the combined margin based on the weighted average as per the tool which is correct. The issue is closed. i. PP has now provided the description on the parameter "electricity exported by the project plant" in the revised Monitoring report. Further PP has now provided calibration details in the revised Monitoring report. The issue is closed.
CL#05 <u>Electricity Export & Import</u> a. Verification team reviewed the "VCS 081211 Worksheet" provided for the "Gas consumption", "Energy export", "GAIL invoices", "Meter calibration details". PP is requested to provide the emission reduction calculations based on the data provided in the excel sheet. The following issues have been identified in the excel sheet. b. PP is requested to check the dates in the excel sheet in line with the dates available in the JMR sheets.	CERs excel sheet	a. The dates in excel sheet is in line with JMR dates b. Electricity data is now also mentioned separately based on "Line-1" and "Line-2".	<u>Electricity Export & Import</u>: a. Verification team could not understand the response provided by PP. where exactly the ER calculations are provided? Please clarify. b. PP is requested to check the dates in the "Energy Export" spreadsheet in the "VCS 081211 Worksheet" against the JMR sheets submitted to the DOE.

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c. PP has provided the electricity generation data in the excel sheet, however PP is further requested to provided the electricity data separately based on "Line-1" and "Line-2".		c. The plant starts operation from 14/04/2009. So the JMR dated 10/05/2009 which gives export value from period 10/04/2009 to 10/05/2009 will actually refer to values only from 14/04/2009 to 10/05/2009.	c. Verification team was not able trace the corrections in-line with the response provided neither in the revised MR not in the revised spreadsheet.
d. The crediting period for the project starts from 14/04/2009. However PP has considered the data for the first month based on "Joint Meter Reading (JMR) dated 10/05/2009 which gives the electricity export value from the period 10/04/2009 to 10/05/2009. Please clarify.		d. Since the JMR dated 10/05/2011 provided the electricity data from period 10/04/2011 to 10/05/2011, the data for the period (10/04/2011 to 13/04/2011) has been derived on pro-rata basis.	d. Commissioning of the plant was verified during the site visit and hence, explanation provided by PP is acceptable. PP is requested to submit necessary documents confirming the grid synchronisation dates.
e. The JMR dated 10/05/2011 provided the electricity data from period 10/04/2011 to 10/05/2011 however the monitoring period is till 13/04/2011. Please clarify how the data for the period (10/04/2011 to 13/04/2011) has been derived in the excel sheet submitted to DOE.			e. PP has not provided response to the issue raised by the DOE. PP to provide the stepwise procedure followed and bring clarity as to how the data for period from 10/04/2011 to 13/04/2011 has been calculated.
CL#05.1 a. Verification team could not understand the response provided by PP. where exactly the ER calculations are provided? Please clarify.		a. Incomplete Emission reduction Sheet was provided to PJR. Now correct sheet is given.	a. PP has now corrected the emission reduction sheet and the issue is closed.
b. PP is requested to check the dates in the "Energy Export" spreadsheet in the "VCS 081211 Worksheet" against the		b. Dates are found to be correct. JMR sheets is submitted to PJR.	b. PP has provided the JMR sheets while

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JMR sheets submitted to the DOE. Please clarify.			is in line with the data provided in the "energy export" spreadsheet provided in the excel sheet. The issue is closed.
c. Verification team was not able trace the corrections in-line with the response provided neither in the revised MR not in the revised spreadsheet.		c. Electricity generation data is given in Line-1 Line-2 format in Energy export Line wise sheet in Emission Reduction sheet.	c. The revised emission reduction calculation sheet has been reviewed and found correct. The issue is closed.
d. Commissioning of the plant was verified during the site visit and hence, explanation provided by PP is acceptable. PP is requested to submit necessary documents confirming the grid synchronisation dates.		d. COD document is provided to suffice Grid synchronisation date.	d. The COD document has been provided by the PP to the DOE. The issue is closed.
e. PP to provide the stepwise procedure followed and bring clarity as to how the data for period from 10/04/2011 to 13/04/2011 has been calculated.		e. For period from 10/04/2011 to 13/04/2011 plant log book for daily values is provided which is further used for ER calculation for these 3 remaining days.)	e. PP has calculated the electricity supplied for three days from 10/04/2011 to 13/04/2011 based on the log books which is found correct. The issue is closed.
CL#06 <u>Gas Consumption</u> a. The gas consumption for the period from 14th April 2009 and 15th April 2009 does not match with the "Gas dispatch summary" provided by the PP. Please clarify.	CERs excel sheet	a. Revised gas dispatch summary is now provided with correct details of gas consumption.	a. Verification team is not able to trace the corrections made by PP. PP to provide explicit details on the corrections made whether in the spreadsheet or in the MR. Also, no Gas dispatch summary is made available. Please clarify.

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b. The gas consumption in the excel sheet from the period 01/05/2009 till 15/05/2009 does not match with the consumption data as per the "Gas dispatch summary" and the "invoices" submitted to the DOE. Please clarify.		b. Revised gas dispatch summary is now provided with correct details of gas consumption.	b. Verification team was not able to trace the corrections in both revised MR and excel spreadsheet. Also, no Gas dispatch summary is made available.
c. Please also provide the "Gas dispatch summary" for rest of the months.		c. Revised gas dispatch summary is now provided with complete details of gas consumption.	c. No Gas dispatch summary is made available to verification team. Please clarify.
d. Please submit the invoices for the months from June 2009 – August 2009.		d. The invoices for all the months is submitted now	d. GAIL invoices for gas consumptions for the period from June 2009 to August 2009 are now made available to Verification team and hence, issue is now closed.
e. The two invoices for the same period (01/09/2009 to 15/09/2009) have been submitted to verification team. Please clarify.		e. Please refer the latest invoice.	e. Response is not clear. The reason for referring to the latest invoice is unclear. Please clarify.
f. The gas consumption in the excel sheet for the month of September 2009, November 2009 does not match with the "Transportation invoice" submitted to the verification team.		f. The correct gas consumptions details are now provided.	f. Verification team was not able to understand whether the corrections have been made if, yes where? Please clarify.
g. The gas records for the month of April are not provided to the verification team. Please clarify.		g. The complete gas records are now provided to the DOE	g. The gas records for the month of April are still missing. Please clarify.
h. Please also submit the "Fortnightly Joint Ticket" for all the months of the monitoring period.		h. Fortnightly joint tickets for all the months are now provided.	h. Verification team has not received the "Fortnightly Joint Ticket" for entire monitoring period. Please submit.

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CL#06.1 a. Verification team is not able to trace the corrections made by PP. PP to provide explicit details on the corrections made whether in the spreadsheet or in the MR. Also, no Gas dispatch summary is made available. Please clarify.		a. As per Gas Dispatch summary,As per Gas dispatch summary Correct values for 14th & 15th April 2009 is now incorporated in excel sheet.	a. The Gas dispatch summary has been provided to the DOE. The justification provided by the PP on the discrepancies is acceptable to the DOE. The issue is closed.
b. Verification team was not able to trace the corrections in both revised MR and excel spreadsheet. Also, no Gas dispatch summary is made available. Please clarify.		b. As per Gas Dispatch summary, Correct values of gas consumption from 1st May 2009 to15th May 2009 is now incorporated in excel sheet.	b. The above issue is closed and hence this issue is closed.
c. No Gas dispatch summary is made available to verification team. Pleas clarify.		c. Gas dispatch summary is made available now.	c. The Gas dispatch summary is now made available to the DOE. The issue is now closed.
e. Response is not clear. The reason for referring to the latest invoice is unclear. Please clarify.		e. Both the submitted invoices are one and the same (One is with 15,703,180 SCMD while the another invoices includes the quantity of in gross MMBTU (GCV). The later one was the typographical mistake.	e. The justification provided by the PP is acceptable to the DOE. The issue is closed.
f. Verification team was not able to understand whether the corrections have been made if, yes where? Please clarify.		f. On crosscheck it was found that details for September 2009 and November 2009 is correctly added in excel sheet. It is a typographical error in Transportation Invoice. Quantity of Gross MMBTU has been mentioned instead of SCMD.	f. The revised response provided in the DVR is acceptable to the DOE. The issue is closed.

Draft report clarification requests and corrective action requests by verification team	Reference	Summary of project owner response	Verification team conclusion
g. The gas records for the month of April are still missing. Please clarify.		g. PP has now submitted the GAIL invoice from 16/04/2009 to 30/04/2009.	g. PP has now submitted the GAIL invoice from 16/04/2009 to 30/04/2009 and the issue is closed.
h. Verification team has not received the "Fortnightly Joint Ticket" for entire monitoring period. Please submit.		h. Fortnightly Joint ticket for entire monitoring period is made available.	h. PP has submitted the fortnightly Joint tickets for the monitoring period and the issue is closed.
CL#07 <u>Calibration</u> a. The project involves use of Gas flow meters, Electricity meters and Gas Chromatograph meters for the measurement purposes. PP is requested to provide a summary of replacements of all meters during the monitoring period.		a. The summary of calibration and replacement of Gas flow meters, Electricity meters and Gas Chromatograph meters is now provided in Annexure-1 of PDD	` a. The summary in the Annexure-1 of the revised MR is reviewed. It still does not cover calibration details for entire monitoring period. Support the same with documentary evidence.
b. As per clause 4.6 of PPA between PP and Transmission corporation of Andhra Pradesh, calibration of main and check meters is required to be done at interval of every six months. However, validated PD and MR states that the same has been done annually. PP is requested to clarify how the same is in-line with the guidance available at EB48, Annex11.	Section 3.2	b. Guidance available at EB48, Annex11 is about PLF and it does not mention anything about calibration.	b. The EB48, Annex11 is wrongly quoted. PP to respond in-line with para17(c), EB61, Annex21 and EB52, Annex60.
c. PP is requested to submit the supplier's technical specification requirements for Gas flow meters and		c. Calibration is done annually as mentioned in the registered PD.	c. PP is requested to respond in-line with assessment of point (b) above.

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Gas chromatograph meters to cross-verify the calibration frequency. d. PP is requested to provide the complete summary of calibration of all the meters involved in the project activity since the start of monitoring period. e. Based on the calibration done PP is requested to identify the delayed calibration period for respective meters. f. Also, in-line with the above PP is requested to apply the correction factor for the delayed calibration period in-line with the latest guidance available at EB48, Annex11. g. The calibration records for the following electricity meters in line with the details provided in the excel sheet is not available. Line1 (main meter no. 07615226) dated 09/10/2010. Line2 (main meter no. 08081471) dated 09/10/2010. Line-2 check meter (meter no. KAU06027) dated 08/08/2008. Line-1 (main meter no. 08081471) dated		d. The complete summary of calibration of all the meters involved in the project activity since the start of monitoring period is now provided in Annexure-1 of PDD. e. delayed calibration is identified for all the meters f. As mentioned in above point there is no delayed calibration identified. The guidance available at EB48, Annex11 is about PLF and it does not mention anything about calibration. g. [All the calibration report of measurement equipment used in monitoring of project activity is now submitted to DOE and a summary of same is now mentioned in Annexure-1 of PDD.]	d. PP has now provided a complete summary of all the meters installed in the revised Monitoring report. The issue is closed. e. PP has applied the delayed calibration factor for the period wherever required. The issue is closed. f. PP has now applied the correction factor for the period where calibration certificates are not available. The issue is closed. g The calibration records are now provided in the Annexure1 of the revised Monitoring report. The issue is closed.

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12/07/2010. The calibration records for the following Gas Chromatograph meters in line with the details provided in the excel sheet is not available. **EMERGENCY PROCEDURE** h. The same is not in-line with the validated PD. PP is requested to specify the same and clarify the scenarios of occurrence, if any. **INTERNAL AUDIT AND PERFORMANCE REVIEWS** i. PP is requested to submit the reports of c audits and performance reviews conducted and include a summary of the same in the MR. **CL#07.1** a. The summary in the Annexure-1 of the revised MR is reviewed. It still does not cover calibration details for entire monitoring period. Support the same with documentary evidence. b. The EB48, Annex11 is wrongly quoted. PP to respond in-line with para17(c), EB61, Annex21 and EB52, Annex60.		h. There were no emergency scenarios during the monitoring period and hence emergency procedures were not applied in monitoring report. i. The reports of internal audits and performance reviews conducted will be submitted soon a. Revised summary table includes all calibration details. Please refer Annexure 1 of the revised MR. b. As per para 17 c of EB61 Annex 21, the calibration has to be done at least once in 3 years. This requirement is met since project has done annual	h. The calibration records is now provided in the Annexure1 of the revised Monitoring report. The issue is closed. i. The calibration records is now provided in the Annexure1 of the revised Monitoring report. The issue is closed. a. PP has now provided the summary of the Calibration certificates in the Annexure-1 of the Monitoring report. The issue is closed. b. The justification provided by the PP is acceptable to the DOE and the issue is closed.

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c. PP is requested to respond in-line with assessment of point (b) above.		calibration which is less than three years. According to EB52, Annex 60, calibration meets the National guidelines too (CEA Installation and Operation of Meters Regulation 2006, para 18b requires calibration at least once in five years) [13] .Thus, PP has followed annual calibration plan as per the validated VCS PD. PP has applied calibration error for 6 months in energy export sheet. c. The accuracy of gas flow meter and gas chromatogram is validated at the time of validation of this VCS project. Also it is as per the calibration reports which is certified by third party and is authentic proof.	c. The justification provided by the PP is acceptable to the DOE and the issue is closed.
CL#08 Please mention the formula used in the calculation of baseline emissions, project emissions and leakages for the project activity under Section 4.0 of the monitoring report.	Section 4.0	The formula used in the calculation of baseline emissions, project emissions and leakages for the project activity are now mentioned in MR before the respective calculation tables.	Response states that the corrections have been made in the "PDD". PP to clarify how the response is in-line with the query. Also, the complete set of formulas is still missing in the revised MR Section 4. Please clarify.
CL#08.1 Response states that the corrections have been made in the "PDD". PP to clarify how the response is in-line with the query. Also,		Set of formulas are now described in the revised MR.	The set of formulas are now traceable in the revised Monitoring report. The issue is closed.

[13] http://powermin.nic.in/whats_new/pdf/Metering_Regulations.pdf

Draft report clarification requests and corrective action requests by verification team	Reference	Summary of project owner response	Verification team conclusion
the complete set of formulas is still missing in the revised MR Section 4. Please clarify.			
CL#09 PP is requested to compare the actual PLF obtained during the monitoring period with the PLF calculated ex-ante in the validated VCS PD.	Section 5.0	The comparison of actual PLF and PLF calculated ex-ante in the validated PD is shown in section 5 of Monitoring report	PP has included comparison of actual PLF achieved and PLF determined ex-ante in the revised MR. However, its only the values that PP has included and no conclusion is provided on the difference observed between the two values. Please check and clarify.
CL#09.1 PP has included comparison of actual PLF achieved and PLF determined ex-ante in the revised MR. However, its only the values that PP has included and no conclusion is provided on the difference observed between the two values. Please check and clarify.		PP has now calculated the PLF on yearly basis. From 14/04/2009 to 31/12/2009, from 01/01/2010 to 31/12/2010, from 01/01/2011 to 13/04/2011. Hence consideration of only 2010 will be accurate as it is covering entire 365 days. PLF calculated for the year 2010 which is 84% is less than 85% as per the validated PD. The lesser PLF which was observed during the year 2010 is due to the less supply of gas.	PP has now provided the conclusion on the differences observed between the PLF determined ex-ante and the actual PLF achieved during the monitoring period. The issue is closed.