VERIFICATION AND CERTIFICATION REPORT

ABAN POWER COMPANY LIMITED

119.8 MW Natural Gas Based Combined Cycle Power Plant, at Tanjavur, Tamilnadu by M/S Aban Power Company Limited

SGS Climate Change Programme
SGS United Kingdom Ltd
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Date of Issue:	**Project Number:**
24/09/2008	CDM.VER0324
Project Title:	
119.8 MW Natural Gas Based Combined Cycle Power Plant, at Tanjavur, Tamilnadu by M/S Aban Power Company Limited	
Organisation:	**Client:**
SGS United Kingdom Limited	Aban Power Company Limited
Publication of Monitoring Report:	
Monitoring Period:	16/05/2007 to 15/06/2008
First Monitoring Version and Date:	Version 1, Dated 30/06/2008
Final Monitoring Version and Date:	Version 3, Dated 24/09/2008

Summary:

SGS United Kingdom Ltd has performed the second periodic verification of the CDM project "119.8 MW Natural Gas Based Combined Cycle Power Plant, at Tanjavur, Tamilnadu by M/S Aban Power Company Limited", UNFCCC Ref. Number 0999. The verification includes confirming the implementation of the monitoring plan of the registered PDD UNFCCC reg. no 0999 and the application of the monitoring methodology as per AM0029 / version 01, dated 19 May 2006. A site visit was conducted to verify the data submitted in the monitoring report.

The project activity involves setting up a 119.8 MW natural gas based Combined Cycle Power Plant and export power to the Tamilnadu State Electricity Board grid, which is a part of Southern regional power grid system of India. The CCPP project activity includes one Gas Turbine Generating Unit of 68.6 MW rated capacity and one Steam Turbine Generating Unit of 51.2 MW rated capacity, the STG unit is attached with an upstream Heat Recovery Steam Generator system.

SGS confirms that the project is implemented in accordance with the validated and registered Project Design Document. The monitoring system is in place and the emission reductions are calculated without material misstatements. Our opinion relates to the projects GHG emissions and the resulting GHG emission reductions reported and related to the valid and registered project baseline and monitoring and its associated documents. Based on the information seen and evaluated we confirm that the implementation of the project has resulted in 215,518 tCO2e during period 16/05/2007 to 15/06/2008.

Subject:		
CDM Verification		
Verification Team:		
Ajoy Gupta – Lead Assessor Kaushik Pal – Local Assessor (Trainee)		☒ No Distribution (without permission from the Client or responsible organisational unit)
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Date: 26/08/2008 Name: Aurea Nardelli	Name: N/A	☐ Limited Distribution
Authorised Signatory:		
Name: Siddharth Yadav Date: 25th September 2008		☐ Unrestricted Distribution

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Abbreviations

BE	Baseline Emissions
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reductions
CO2	Carbon Dioxide
COP/MOP	Conference of Parties serving as the Meeting of Parties to Kyoto Protocol
DNA	Designated National Authority
DOE	Designated Operational Entity
DR	Document Review
ER	Emission Reduction
GAIL	GAIL (India) Pvt. Ltd.
GHG	Greenhouse Gas(es)
IPCC	Intergovernmental Panel on Climate Change
MT	Metric Tonne
NIR	New Information Request
PDD	Project Design Document
PE	Project Emissions
SCM	Standard Cubic Meter
TNEB	Tamil Nadu State Electricity Board
UNFCCC	United Nations Framework Convention for Climate Change

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1. Introduction

1.1 Objective

SGS United Kingdom Ltd has been contracted by Aban Power Company Limited to perform an independent verification of its CDM project 119.8 MW Natural Gas Based Combined Cycle Power Plant, at Tanjavur, Tamilnadu by M/S Aban Power Company Limited. CDM projects must undergo periodic audits and verification of emission reductions as the basis for issuance of Certified Emission Reductions (CERs).

The objectives of this verification exercise are, by review of objective evidence, to establish that:

- The emissions report conforms with the requirements of the monitoring plan in the registered PDD and the approved methodology; and
- The data reported are complete and transparent.

1.2 Scope

The scope of the verification is the independent and objective review and ex post determination of the monitored reductions in GHG emission by the project activity. The verification is based on the validated and registered project design document and the monitoring report. The project is assessed against the requirements of the Kyoto Protocol, the CDM Modalities and Procedures and related rules and guidance.

SGS has, based on the recommendations in the Validation and Verification Manual, and employed a risk-based approach in the verification, focusing on the identification of significant reporting risks and the reliability of project monitoring.

The verification is not meant to provide any consulting towards the Client. However, stated requests for clarifications and/or corrective actions may provide input for improvement of the project design.

1.3 Project Activity and Period Covered

This engagement covers emissions and emission reductions from anthropogenic sources of greenhouse gases included within the project boundary of the following project and period.

Title of Project Activity:	119.8 MW Natural Gas Based Combined Cycle Power Plant, at Tanjavur, Tamilnadu by M/S Aban Power Company Limited
UNFCCC Registration Number:	0999
Monitoring Period Covered in this Report	16/05/2007 to 15/06/2008
Project Participants	Aban Power Company Limited
Location of the Project Activity:	Village – Karuppur, Thanjavur District, Tamilnadu, India Longitude - 79º31'30" Latitude - 11º7'30"

The project activity involves setting up a 119.8 MW Natural Gas based Combined Cycle Power Plant and export power to the Tamilnadu State Electricity Board grid, which is a part of Southern regional power grid system of India. The CCPP project activity includes one Gas Turbine Generating Unit of 68.6 MW rated capacity and one Steam Turbine Generating Unit of 51.2 MW rated capacity, the STG unit is attached with an upstream Heat Recovery Steam Generator system.

This power plant operating on cleaner fuel like Natural Gas and leading to lower Carbon Dioxide (GHG) emissions for producing equivalent amount of power as compared to the other power plants in the region operating on other carbon intensive fossil fuels.

2. Methodology

2.1 General Approach

SGS's approach to the verification is a two-stage process.

In the first stage, SGS completed a strategic review and risk assessment of the projects activities and processes in order to gain a full understanding of:

- Activities associated with all the sources contributing to the project emissions and emission reductions, including leakage if relevant;
- Protocols used to estimate or measure GHG emissions from these sources;
- Collection and handling of data;
- Controls on the collection and handling of data;
- Means of verifying reported data; and
- Compilation of the monitoring report.

At the end of this stage, SGS produced a Periodic Verification Checklist which, based on the risk assessment of the parameters and data collection and handling processes for each of those parameters, describes the verification approach and the sampling plan.

Using the Periodic Verification checklist, SGS verified the implementation of the monitoring plan and the data presented in the Monitoring Report for the period in question. This involved a site visit and a desk review of the monitoring report. This verification report describes the findings of this assessment.

2.2 Verification Team for this Assessment

Name	Role	SGS Office
Ajoy Gupta	Lead Assessor	SGS IN
Kaushik Pal	Local Assessor (Trainee)	SGS IN

2.3 Means of Verification

2.3.1 Review of Documentation

The validated PDD, the monitoring report submitted by the client and additional background documents related to the project performance were reviewed. A complete list of all documents reviewed is attached in section 0 of this report.

2.3.2 Site Visits

As part of the verification, the following on-site inspections have been performed

Location: Village – Karuppur, Thanjavur District, Tamilnadu, India (Longitude - 79º31'30" Latitude - 11º7'30")	
Date: 17th July, 2008.	
Coverage:	**Source of Information / Persons Interviewed**
Overall project planning, roles & responsibility for the designated project management team and Verification of monitoring and data handling procedure	Mr. V. Ravindran, COO, Project Head Mr. S. Kathir Kamanathan – G.M. (Finance), Project Coordinator Mr. B.V. Udhaya Kumar, G.M. (Operations), Site Coordinator Mr. G. Srinivasa Rao, Chief Manager (Maintenance), Committee Member Mr. R.K. Dhenge, Chief Manager (Maintenance), Committee Member
Confirmation of data collection and handling procedures. Cross checking daily records, monthly records, emission reduction calculation.	Mr. V. Ravindran, COO, Project Head Mr. S. Kathir Kamanathan – G.M. (Finance), Project Coordinator Mr. B.V. Udhaya Kumar, G.M. (Operations), Site Coordinator Mr. G. Srinivasa Rao, Chief Manager (Maintenance), Committee Member Mr. R.K. Dhenge, Chief Manager (Maintenance), Committee Member
Assessment of project boundary, inspection of infrastructure and equipments, calibration, maintenance, personnel training. Detailed audit of project procedures, verification of implementation of monitoring procedures.	Mr. V. Ravindran, COO, Project Head Mr. S. Kathir Kamanathan – G.M. (Finance), Project Coordinator Mr. B.V. Udhaya Kumar, G.M. (Operations), Site Coordinator Mr. G. Srinivasa Rao, Chief Manager (Maintenance), Committee Member Mr. R.K. Dhenge, Chief Manager (Maintenance), Committee Member

2.4 Reporting of Findings

As an outcome of the verification process, the team can raise different types of findings

In general, where insufficient or inaccurate information is available and clarification or new information is required the team shall raise a New Information Request (NIR) specifying what additional information is required.

Where a non-conformance arises the team shall raise a Corrective Action Request (CAR). A CAR is issued, where:

I. the verification is not able to obtain sufficient evidence for the reported emission reductions or part of the reported emission reductions. In this case these emission reductions shall not be verified and certified;

II. the verification has identified misstatements in the reported emission reductions. Emission reductions with misstatements shall be discounted based on the verifiers ex-post determination of the achieved emission reductions

The verification process may be halted until this information has been made available to the assessors' satisfaction. Failure to address a NIR may result in a CAR. Information or clarifications provided as a result of an NIR may also lead to a CAR.

Observations may be raised which are for the benefit of future projects and future verification actors. These have no impact upon the completion of the verification activity.

Corrective Action Requests and New Information Requests are detailed in Periodic Verification Checklist. The Project Developer is given the opportunity to "close" outstanding CARs and respond to NIRs and Observations.

2.5 Internal Quality Control

Following the completion of the assessment process and a recommendation by the Assessment Team, all documentation will be forwarded to a Technical Reviewer. The task of the Technical Reviewer is to check that all procedures have been followed and all conclusions are justified. The Technical Reviewer will either accept or reject the recommendation made by the assessment team.

3. Verification Findings

3.1 Project Documentation and Compliance with the Registered PDD

The project documentation was found in compliance with the registered PDD. The project was registered with CDM EB on 26/05/2007 and the project meets the criteria for claiming credits for the monitoring period which starts from 16/05/2007 to 15/06/2008. This was checked from the UNFCCC website: http://cdm.unfccc.int/Projects/DB/RWTUV1173779090.0/view.

3.2 Monitoring Results

Annual quantity of fuel "NG" consumed in project activity – $FC_{f,y}$ (SCM)

Natural gas is supplied by GAIL (India) Ltd. through its pipeline from gas wells up to the power plant boundary. Fuel gas supplier have the necessary pressure regulation, conditioning and tariff gas metering station at their gas supply terminal near power plant to ensure proper monitoring and quantification of gas intake in the power plant.

The natural gas consumption at the project site is continuously metered through panel mounted flow computer system installed at the project site. The monitoring system for natural gas consumption has been found consistent with the requirement of AM0029 ver01 and monitoring plan of the registered PDD. The specification of gas flow monitoring equipment was verified during verification site visit. The panel mounted flow computer system for gas flow monitoring is calibrated on periodic intervals, jointly by project proponent and public sector natural gas supplier GAIL India Ltd. The calibration records were checked and found within validity period. The reference of the joint calibration reports has been checked as follows:

Monitoring equipment Details	Periodic Calibration Details
Panel mounted flow computer system Make: Barton Instrument Systems Model: Scanner 1131 Serial No. 1641 Board ID: 10063576 Metering Loop/ Tag No.: FY-1902	GAIL India Ltd. certified Joint Calibration Report dated 27/02/2007 Joint Calibration Report dated 04/06/2007 Joint Calibration Report dated 25/09/2007 Joint Calibration Report dated 26/03/2008 Joint Calibration Report dated 12/05/2008

The natural gas consumption value measured through panel mounted flow computer system is being registered in two simultaneous procedures.

The daily (a day in this case is referred to 24 hour period between, 12:00 hrs IST on the previous date to till 1200 hours IST on the said date) natural gas consumption values are recorded manually in the log books and reviewed by the General Manager (O&M). Further the daily data for the entire month is complied by Operations Department of Aban Power Company Ltd. as monthly report and forwarded to Chief Operating Officer for further review and finally submitted to Whole Time Director for approval.

Parallel to that, the monthly natural gas consumption is also registered in Joint Meter Reading Report approved by Tamilnadu State Electricity Board, GAIL (India) Ltd. and the project proponent.

The natural gas consumption data has been reported based on the monthly Joint Meter Reading Reports approved by Tamilnadu State Electricity Board, GAIL (India) Ltd. and the project proponent. The reported values for natural gas consumption have been cross checked with reference to the respective monthly plant reports, monthly joint meter reading reports and found consistent.

Electricity exported to grid by the project activity – $EG_{PJ,y}$ (MWh)

The net electricity export is being continuously measured by four sets of electronic trivector energy meters (main and check) which are installed at the project site and duly sealed by the Tamilnadu State Electricity Board. The four sets of energy meters are synchronised with grid system through four designated feeders. Also there is an

in-house DCS system which is used to keep a check on the daily power generation & Power export readings, but the real time data logging being done through main energy meters. The monitoring system for electricity exported to the grid has been found consistent with the requirement of AM0029 ver01 and monitoring plan of the registered PDD. The energy meters are calibrated once in six months under the scope of Tamil Nadu State Electricity Board through NABL, India accredited laboratory.

The specification of energy meters and calibration records verified during verification site visit as are mentioned below:

Feeder	**Monitoring Eequipment Details**	**Calibration Details**
Kadalangudi feeder:	Main meter: Make: Larsen & Toubro Ltd. Type: ER300P S/n: 04187302	Calibration agency: Electronic Test & Development Centre, Chennai, Govt. of India Calibration Report Ref. ETDC(CN)/2006/23425 dated 01/02/2007 Calibration agency: Central Power Research Institute, Bangalore Calibration Report Ref. IDEMTL0708T0118 dated 13/07/2007 Calibration Report Ref. IDEMTL0708T0363 dated 23/01/2008
	Check meter: Make: Larsen & Toubro Ltd. Type: ER300P S/n: 04187303	Calibration agency: Electronic Test & Development Centre, Chennai, Govt. of India Calibration Report Ref. ETDC(CN)/2006/23894 dated 01/03/2007 Calibration agency: Central Power Research Institute, Bangalore Calibration Report Ref. IDEMTL0708T0180 dated 20/08/2007 Calibration Report Ref. IDEMTL0708T0384 dated 11/02/2008
Manalmedu feeder:	Main meter Make: Larsen & Toubro Ltd. Type: ER300P S/n: 04249077	Calibration agency: Electronic Test & Development Centre, Chennai, Govt. of India Calibration Report Ref. ETDC(CN)/2006/23424 dated 01/02/2007 Calibration agency: Central Power Research Institute, Bangalore Calibration Report Ref. IDEMTL0708T0115 dated 13/07/2007 Calibration Report Ref. IDEMTL0708T0367 dated 23/01/2008
	Check meter Make: Larsen & Toubro Ltd. Type: ER300P S/n: 04249078	Calibration agency: Electronic Test & Development Centre, Chennai, Govt. of India Calibration Report Ref. ETDC(CN)/2006/23895 dated 01/03/2007 Calibration agency: Central Power Research Institute, Bangalore Calibration Report Ref. IDEMTL0708T0183 dated

		20/08/2007 Calibration Report Ref. IDEMTL0708T0387 dated 11/02/2008
Cuddalore feeder:	Main meter Make: Larsen & Toubro Ltd. Type: ER300P S/n: 04187300	Calibration agency: Electronic Test & Development Centre, Chennai, Govt. of India Calibration Report Ref. ETDC(CN)/2006/23421 dated 01/02/2007 Calibration agency: Central Power Research Institute, Bangalore Calibration Report Ref. IDEMTL0708T0114 dated 13/07/2007 Calibration Report Ref. IDEMTL0708T0362 dated 23/01/2008
	Check meter Make: Larsen & Toubro Ltd. Type: ER300P S/n: 04187301	Calibration agency: Electronic Test & Development Centre, Chennai, Govt. of India - Calibration Report Ref. ETDC(CN)/2006/23897 dated 01/03/2007 Calibration agency: Central Power Research Institute, Bangalore - Calibration Report Ref. IDEMTL0708T0181 dated 20/08/2007 - Calibration Report Ref. IDEMTL0708T0383 dated 11/02/2008
Kattumanarkoli feeder:	Main meter Make: Larsen & Toubro Ltd. Type: ER300P S/n: 04249074	Calibration agency: Electronic Test & Development Centre, Chennai, Govt. of India - Calibration Report Ref. ETDC(CN)/2006/23426 dated 01/02/2007 Calibration agency: Central Power Research Institute, Bangalore - Calibration Report Ref. IDEMTL0708T0113 dated 13/07/2007 - Calibration Report Ref. IDEMTL0708T0366 dated 23/01/2008
	Check meter Make: Larsen & Toubro Ltd. Type: ER300P S/n: 04249081	Calibration agency: Electronic Test & Development Centre, Chennai, Govt. of India - Calibration Report Ref. ETDC(CN)/2006/23893 dated 01/03/2007 Calibration agency: Central Power Research Institute, Bangalore - Calibration Report Ref. IDEMTL0708T0184 dated 20/08/2007 - Calibration Report Ref. IDEMTL0708T0388 dated 11/02/2008

The calibration records for all energy meters were checked and found within validity period.

The data for electricity exported to grid is continuously measured and is being registered in two simultaneous procedures:

- The daily (a day in this case is referred to 24 hour period between, 12:00 hrs IST on the previous date to till 1200 hours IST on the said date) electricity exported to grid values are recorded manually in the log books and reviewed by the General Manager (O&M). Further the daily data for the entire month is complied by Operations Department of Aban Power Company Ltd. as monthly report and forwarded to Chief Operating Officer for further review and finally submitted to Whole Time Director for approval.
- Parallel to that, the monthly electricity exported to grid is also registered in Joint Meter Reading Report approved by Tamilnadu State Electricity Board, GAIL (India) Ltd. and the project proponent.
- The electrical data for the electricity exported to grid has been reported based on the monthly Joint Meter Reading Report approved by Tamilnadu State Electricity Board, GAIL (India) Ltd. and the project proponent. The reported values for electricity exported to grid have been cross checked with reference to the respective plant monthly reports, monthly joint meter reading reports and found consistent.

CAR 01 was raised as the Natural gas consumption values and Electricity exported to grid by the project activity data for the period 12.00Hrs on 15-12-2007 to 24.00Hrs, on 31-12-2007 and 00.00Hrs. on 01-01-2008 to 12.00Hrs. on 15-01-2008 as mentioned in the Monitoring Report, ver01 are not matching with the Monthly report of power generation, export, gas consumption for the said period.

The Natural gas consumption values and Electricity exported to grid by the project activity data for the period 12.00Hrs. on 15-12-2007 to 24.00Hrs. on 31-12-2007 and 00.00Hrs. on 01-01-2008 to 12.00Hrs. on 15-01-2008 has been further rectified by the project proponent with reference to the daily measured Natural gas consumption and Electricity exported to grid data as registered in the Monthly report of power generation, export and gas consumption report for the month of January 2008.

The total Natural gas consumption and Electricity exported to grid data for the period 12.00Hrs. on 15-12-2007 to 12.00Hrs. on 15-01-2008 has been cross checked with the Tamil Nadu State Electricity Board and GAIL India Ltd. certified monthly joint meter reading report dated 15/01/2008 and the respective data for the concerned above mentioned period has been cross checked with the Monthly report of power generation, export and gas consumption report for the month of January 2008 and all the data mentioned in the final Monitoring Report are found consistent. Thus CAR 01 was closed out.

Net Calorific Value of Natural Gas - NCV_y (Kcal/SCM)

Net Calorific Value of natural gas used is based on the fortnight Gas Invoices provided by the public sector NG gas supplier GAIL India Limited.

The monthly and thereafter annual weighted average net calorific value of the natural gas consumed is determined from the respective fortnight value supplied by the gas supplier. The weighted average monthly single NCV of natural gas is determined considering two fortnight NCVs registered per month. The monitoring system for NCV of natural gas consumed has been found consistent with the requirement of AM0029 ver01 and monitoring plan of the registered PDD.

The data acquisition and data processing systems are well in place. The calorific values data are maintained by the Operations Department, which is further verified/ reviewed by General Manager (Operations) and Chief Operating Officer (COO) in monthly interval.

The monthly and annual reported data were cross checked with fortnight natural gas supply invoices containing weighted average calorific value for fortnight as provided by the natural gas supplier (GAIL India Ltd.) and plant monthly report. The reported values were found consistent.

CO_2 Emission Coefficient of Natural Gas - $COEF_y$ (tCO_2/m^3)

CO_2 emission coefficient of natural gas is calculated by multiplying the natural gas Net Calorific Value, CO_2 emission factor and Oxidation factor of the natural gas consumed. The formula applied is found in accordance with the AM0029 version 1 and registered PDD.

The data acquisition and data processing systems are well in place. The CO_2 emission coefficient of natural gas is calculated by the Operations Department, which is further verified/ reviewed by General Manager (Operations) and Chief Operating Officer (COO) in monthly interval.

The calculation for CO_2 emission coefficient of natural gas as provided in the CER calculation sheet and found satisfactory.

The CO_2 emission coefficient of natural gas as mentioned in the page no. 10 of Monitoring Report, version 01 is mismatching with the value provided in the CER calculation sheet. Moreover, calendar year wise $COEF_y$ value has not been provided in the MR, version 01 and as well as in the CER calculation sheet, version 01. Thus CAR 02 was raised.

The value for CO_2 emission coefficient of natural gas as mentioned in Monitoring Report, version 01has been rectified as 0.00219 tCO_2/m^3 and year wise COEFy value has been represented appropriately the in final Monitoring Report. The calculation for COEFy has been cross checked in the CER calculation sheet, version 02 and found satisfactory. Hence accepted and CAR 02 was closed out.

Emission Factor for Upstream Fugitive Methane Emissions Occurring in the Absence of the Project Activity - $EF_{BL,upstream,CH4}$ (t_{CH4}/MWh)

The emission factor for upstream fugitive CH4 emissions occurring in absence of the project activity is calculated keeping consistency with the baseline emission factor used for the project activity in accordance with requirement of the applied methodology AM0029, version 01:

Option 1: Build Margin

$$EF_{BL,upstream,CH4} = \frac{\sum_j FF_{j,k} \cdot EF_{k,upstream,CH4}}{\sum_j EG_j}$$

The formula applied for the calculation is found in accordance with the AM0029 version 1 and registered PDD.

The data acquisition and data processing systems are well in place. The upstream fugitive CH4 emissions occurring in absence of the project activity is calculated *ex post* by the project proponent with help of professional project consultants.

CAR03 was raised as the value of emission factor for upstream fugitive CH4 emissions occurring in absence of the project activity has not been reported in the Monitoring Report, version 01 and the calculation of $EF_{BL,upstream,CH4}$ was not transparent as the data and respective data sources used for calculation of the same are not clearly represented in the calculation worksheet.

The project proponent has represented the detail calculation for emission factor for upstream fugitive CH4 emissions occurring in absence of the project activity along with Southern Regional Grid system power generation data in the CER calculation worksheet, ver02. The calculation of *EFBL,upstream,CH4* has been reviewed and found in line with the requirement of applied Methodology AM0029 ver01. The re-calculated *EFBL,upstream,CH4* value has been verified as 0.000913 tCH4/MWh and the verified value is properly incorporated in the leakage calculation and final Monitoring Report. All the data used for the same calculation are traceable from official source CO2 Baseline Database for the Indian Power Sector, Version 3, dated 15th December 2007 published by the Central Electricity Authority, Ministry of Power, Govt. of India. The data sources are now properly mentioned in the CER calculation sheet and final Monitoring Report. Therefore CAR 03 was closed out.

3.3 Remaining Issues, CAR's, FAR's from Previous Validation or Verification

The project got registered with the CDM EB as on 26th May 2007 and hence there are no issues remaining to be addressed with regard to Validation. Since registration this is the second monitoring period starting from 16/05/2007 to 15/06/2008 and there are no previous issues remaining to be addressed with regard to Verification.

3.4 Project Implementation

Project was implemented and equipment installed as described in the registered PDD; the project was registered with CDM EB on 26/05/2007 (UN Ref. 0999) and the current monitored period includes the period from 16/05/2007 to 15/06/2008.

3.5 Completeness of Monitoring

The reporting procedures reflect the content of the monitoring plan. The monitoring mechanism is effective and reliable.

3.6 Accuracy of Emission Reduction Calculations

The calculation of emission reductions is found to be correct. Four CARs raised during the second periodic verification were closed out. The details of the reported and the verified values for all parameters are listed in section 1.

3.7 Quality of Evidence to Determine Emission Reductions

Critical parameters used for the determination of the Emission Reductions are discussed above in section 3.2 above. All the data recorded is in compliance with the monitoring report.

3.8 Management System and Quality Assurance

Aban Power Company Ltd. has well defined management structure which ensures the quality of data monitored and involves a dedicated team comprising of team members with adequate knowledge and expertise. The data management process is well defined and robust. The company is certified to ISO 14001:2004 and OHSAS 18001:1999. They have a well de-fined internal QA/QC system as a part of good operating practice as the result of which all the aspects of the process is documented in terms of operating procedure, reporting, recording, responsibilities etc. A designated CDM project committee has been formed for appropriate operation of the CDM project activity. The CDM team comprises of a special group of operators who are assigned the responsibility of monitoring of different parameters and record keeping.

CDM Committee		
Position for CDM activities	Name	Designation
Overall Project In charge	Mr. P. Panduranga Rao	Director & CEO
Project Head	Mr. V. Ravindran	COO
Project Coordinator	Mr. S. Kathir Kamanathan	G.M. (Finance)
Site Coordinator	Mr. B.V. Udhaya Kumar	G.M. (Operations)
Committee Member	Mr. G. Srinivasa Rao	Chief Manager (Maintenance)
Committee Member	Mr. R.K. Dhenge	Chief Manager (Maintenance)

On a monthly basis, the monitoring reports are reviewed and discussed by the seniors CDM team members/managers. In case any irregularity observed by any of the CDM team member, it is informed to the concerned person for necessary actions. On monthly basis, these reports are forwarded at the management level. A biannual internal audit procedure is in place, this also ensures the proper QA-QC approach for the project activity.

3.9 Data from External Sources

Baseline CO_2 Emission Factor – $EF_{BL,CO2,y}$ (tCO_2/MWh)

In accordance to the requirement of the applied methodology AM0029, version 01, project participants has analysed EFBL,CO2,y *ex ante* and the lowest emission factor as Build Margin has been selected in order to address this uncertainty in a conservative manner. Further the Baseline CO2 Emission Factor for the current monitored period has been estimated *ex-post* in accordance with the requirements of AM0029, version 01, page 05.

The *ex post* estimation of Baseline CO_2 Emission Factor is not transparent as the detail emission factor calculation is not available for cross check and the data and respective data sources used for Baseline CO_2 Emission Factor has not been mentioned in the monitoring report, version 01, thus CAR 04 was raised for further clarification.

The Build Margin baseline emission factor for Southern Regional Grid system of India as applied for the emission reduction calculation has been cross checked with CO2 Baseline Database for the Indian Power Sector, Version 3, dated 15th Dec 2007 published by the Central Electricity Authority, Ministry of Power, Govt. of

India (available at http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm) and verified as 0.705 tCO2/MWh in accordance with latest available data for the year 2006-2007. Baseline emission factor value and source of the same are appropriately represented in the CER calculation sheet and final Monitoring report, thus CAR 04 was closed out.

Oxidation factor of the natural gas used - $OXID_f$

The IPCC default value for oxidation factor of natural gas has been used for calculation of CO2 emission coefficient of natural gas, this is found consistent with the requirements of applied methodology AM0029 ver 01 and the monitoring plan of registered PDD.

IPCC default value for oxidation factor of natural gas as per 2006 IPCC guidelines for National Green House Gas inventories has been cross checked as 1.0 and found consistent.

CO_2 emission factor of natural gas - $EF_{CO2,f,y}$ (tCO_2/TJ)

There is no data available for CO_2 emission factor of natural gas neither from fuel supplier nor from any local source for reference. This fact has been cross checked with the fuel supplier's invoices between the period May 2007 to June 2008 and found consistent. India's Initial National Communication to the UNFCCC (Publication date 22/06/2004; Call number IND/COM/1 B; available at http://unfccc.int/resource/docs/natc/indnc1.pdf) refers to IPCC default values and recommends use of IPCC default value for estimation of CO_2 emissions from the burning of petroleum and natural gas.

Due to unavailability of fuel supplier's data or local data, as per the Host Country National recommendation IPCC default value for CO_2 emission factor of natural gas has been referred on annual basis and used for calculation of CO_2 emission coefficient of natural gas for the current monitoring year *i.e.* 16-05-2007 to 15-06-2008. The applied value for CO_2 emission factor of natural gas (56.1 tCO_2/TJ) has been cross checked with 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Chapter 2: Stationary Combustion, Table 2.2 Default Emission Factors for Stationary Combustion in the Energy Industries and found satisfactory.

Thus consideration of IPCC default CO_2 emission factor of natural gas for the current monitoring period as per the National recommendation has been found in accordance with the requirement of AM0029, Version 01. Therefore the applied CO_2 emission factor of natural gas found justified and hence accepted.

The applied value is also found consistent with the CO_2 emission factor of natural gas value used for *ex-ante* emission reduction calculation.

Emission factor for upstream fugitive methane emissions of natural gas from production, transportation, distribution - $EF_{NG,Upstream,CH4}$ (tCH_4/GJ)

The Emission factor for upstream fugitive methane emissions of natural gas from production, transportation, distribution is determined ex-ante during the CDM registration stage applying methodological choice of default values provided in table 2 in the Methodology AM0029, version 01. The value is fixed for the entire crediting period as 160 tCH_4/PJ.

The value has been cross checked with the CDM registered PDD, page 32 (available at http://cdm.unfccc.int/Projects/DB/RWTUV1173779090.0/view) of the project activity (UN0999) and found satisfactory.

Emission factor for fugitive CH4 upstream emissions for coal (t CH4 / kt coal)

The emission factor for fugitive CH4 upstream emissions for coal has been used as per the methodological choice of default values provided in table 2 in the Methodology AM0029, version 01. This is found consistent with the requirements of applied methodology AM0029 ver 01 and the monitoring plan of registered PDD.

The value 0.8 tCH4/kt has been cross checked with the default values provided in table 2 in the Methodology AM0029, version 01, dated 19 May 2006 and found consistent.

Emission factor for fugitive CH4 upstream emissions for oil (tCH4/PJ)

The emission factor for fugitive CH4 upstream emissions for coal has been used as per the methodological choice of default values provided in table 2 in the Methodology AM0029, version 01. This is found consistent with the requirements of applied methodology AM0029 ver 01 and the monitoring plan of registered PDD.

The value 4.1 tCH4/PJ has been cross checked with the default values provided in table 2 in the Methodology AM0029, version 01, dated 19 May 2006 and found consistent.

4. Calculation of Emission Reductions

Parameter	***Reported Value*** 16/05/2007 to 15/06/2008	***Verified Value*** 16/05/2007 to 15/06/2008
1. Annual quantity of natural gas consumed in project activity ($FC_{f,y}$)	185,697,552 SCM	185,697,552 SCM
2. Electricity exported to grid by the project activity ($EG_{PJ,y}$)	893,934.93 MWh	893,934.928 MWh
3. Net Calorific Value of natural gas consumed (NCV_y) - Kcal/SCM	16/05/2007 - 31/12/2007: 9339.16 01/01/2008 - 15/06/2008: 9349.66 **16/05/2007 to 15/06/2008: 9343.38**	16/05/2007 - 31/12/2007: 9339.03 01/01/2008 - 15/06/2008: 9349.68 **16/05/2007 to 15/06/2008: 9343.29**
4. Oxidation factor of the natural gas used ($OXID_f$)	1.0	1.0
5. CO_2 emission factor of natural gas ($EF_{CO2,f,y}$) ŦŦ	56.1 tCO_2/TJ	56.1 tCO_2/TJ
6. CO_2 emission coefficient of natural gas ($COEF_y$), tCO_2/m^3	0.0219	16/05/2007 - 31/12/2007: 0.00219 01/01/2008 - 15/06/2008: 0.00220 **16/05/2007 to 15/06/2008:** 0.00219
7. Emission factor for upstream fugitive methane emissions occurring in the absence of the project activity ($EF_{BL,upstream,CH4}$)	0.000935 t_{CH4}/MWh	0.000913 t_{CH4}/MWh
8. Emission factor for upstream fugitive methane emissions of natural gas from production, transportation, distribution - $EF_{NG,Upstream,CH4}$ ŦŦ	160 tCH_4/GJ	160 tCH_4/GJ
9. GWP_{CH4}	21	21
10. Baseline CO_2 Emission Factor	0.705 tCO_2/MWh	0.705 tCO_2/MWh
Emission reductions (tCO_2 e)	215,925*	215,518

ŦŦ These parameters are determined ex-ante and the value are fixed for the entire crediting period, as mentioned under registered PDD.
* Monitoring report version 1.

The emission reduction calculation is done as per the methodological choice mentioned under registered PDD.

1. CO_2 emission coefficient of natural gas, $COEF_y = NCV_y * EF_{CO2,f,y} * OXID_f$ tCO_2/m^3
   $= 0.00219$ tCO_2/m^3

1. Project Emissions (PEy) $= FC_{f,y} * COEF_y$ tCO_2
   $= 407,445$ tCO_2
2. Baseline emissions (BEy) $= EG_{PJ,y} * EF_{BL,CO2,y}$ tCO_2
   $= 630,226$ tCO_2
3. Leakage Emissions (LEy) $= LECH_{4y} = (FC_{f,y} * NCV_y * EF_{NG,Upstream,CH4} - EG_{PJ,y} * EF_{BL,upstream,CH4})$ GWP_{CH4} tCO_2
   $= 7,263$ tCO_2
4. Emission Reductions (ERy) $= BEy - PEy - LEy$ tCO_2
   $= 215,518$ tCO_2

5. Recommendations for Changes in the Monitoring Plan

No recommendation was provided to the client to improve their monitoring plan.

6. Overview of Results

Assessment Against the Provisions of Decision 17/CP.7:

Is the project documentation in accordance with the requirements of the registered PDD and relevant provision of decision 17/CP.7, EB decisions and guidance and the COP/MOP?

Yes. The results of the compliance assessment are recorded in the verification checklist which is used as an internal report only.

Have on-site inspections been performed that may comprise, inter alia, a review of performance records, interviews with project participants and local stakeholders, collection of measurements, observations of established practices and testing of the accuracy of monitoring equipment?

Yes. Mr Ajoy Gupta visited the sites and undertook interviews, collected data, audited the implementation of procedures, checked calibration certificates and checked data, inter alia.

The results of the site visits are recorded in the verification checklist which is used as an internal report only.

The evidences have been checked and collected. The revised monitoring report is attached with this verification report.

Has data from additional sources been used? If yes, please detail the source and significance.

The IPCC default value for CO2 emission factor of natural gas has been used for calculation of CO2 emission coefficient of natural gas and the value (56.1 tCO_2/TJ) is fixed for the entire crediting period.

The Emission factor for upstream fugitive methane emissions of natural gas from production, transportation, distribution is determined ex-ante during the CDM registration stage applying methodological choice of default values provided in table 2 in the Methodology AM0029, version 01. The value is fixed for the entire crediting period as 160 tCH_4/PJ.

The emission factor for fugitive CH4 upstream emissions for coal as 0.8 tCH4/kt has been used as per the methodological choice of default values provided in table 2 in the Methodology AM0029, version 01.

The emission factor for fugitive CH4 upstream emissions for coal as 4.1 tCH4/PJ has been used as per the methodological choice of default values provided in table 2 in the Methodology AM0029, version 01.

Please review the monitoring results and verify that the monitoring methodologies for the estimation of reductions in anthropogenic emissions by sources have been applied correctly and their documentation is complete and transparent.

Yes. The monitoring methodology has been correctly applied and the monitoring report and supporting references are complete and transparent.

Have any recommendations for changes to the monitoring methodology for any future crediting period been issued to the project participant?

No recommendation was provided to the Client to change the Monitoring Plan.

Determine the reductions in anthropogenic emissions by sources of greenhouse gases that would not have occurred in the absence of the CDM project activity, based on the data and information using calculation procedures consistent with those contained in the registered project design document and the monitoring plan.

The data used in anthropogenic emission reduction calculation is consistent with those contained in the registered PDD and monitoring plan. The emission reduction was 196,249 tCO2 for the period 16/05/2007 to 15/06/2008, as per the estimation made in the registered PDD. The actual emission reduction has been verified as 215,518 tCO2 for the same period. The increase in actual verified emission reduction value has occurred due to ex-post determination of emission factors in accordance with applied methodology AM0029 ver01.

Identify and inform the project participants of any concerns related to the conformity of the actual project activity and its operation with the registered project design document. Project participants shall address the concerns and supply relevant additional information.

No such non conformity of the actual project activity and its operation with the registered project design document has been observed.

Post monitoring report on UNFCCC website

Yes, the monitoring report is available under UNFCCC Project Reference Number 0999 on UNFCCC, http://cdm.unfccc.int/Projects/DB/RWTUV1173779090.0/view

7. Verification and Certification Statement

SGS United Kingdom Ltd has been contracted by Aban Power Company Limited to perform the verification of the emission reductions reported for the CDM project 119.8 MW Natural Gas Based Combined Cycle Power Plant, at Tanjavur, Tamilnadu by M/S Aban Power Company Limited, UNFCCC Reference No 0999 in the period 16/05/2007 to 15/06/2008.

The verification is based on the validated and registered project design document and the monitoring report for this project. Verification is performed in accordance with section I of Decision 3/CMP.1, and relevant decisions of the CDM EB and CoP/MoP. The scope of this engagement covers the verification and certification of greenhouse gas emission reductions generated by the above project during the above mentioned period, as reported in 119.8 MW Natural Gas Based Combined Cycle Power Plant, at Tanjavur, Tamilnadu by M/S Aban Power Company Limited, dated 24/09/2008, Version 3 of the Monitoring Report.

The Management of the Aban Power Company Limited is responsible for the preparation of the GHG emissions data and the reported GHG emissions reductions on the basis set out within the project Monitoring Report / Version 2 dated 11/08/2008. Calculation and determination of GHG emission reductions from the project is the responsibility of the management of the 119.8 MW Natural Gas Based Combined Cycle Power Plant, at Tanjavur, Tamilnadu by M/S Aban Power Company Limited. The development and maintenance of records and reporting procedures are in accordance with the monitoring report.

It is our responsibility to express an independent GHG verification opinion on the GHG emissions and on the calculation of GHG emission reductions from the project for the period 16/05/2007 to 15/06/2008 based on the reported emission reductions in the Monitoring Report / version 3 dated 24/09/2008 for the same period.

Based on an understanding of the risks associated with reporting GHG emissions data and the controls in place to mitigate these, SGS planned and performed our work to obtain the information and explanations that we considered necessary to provide sufficient evidence for us to give reasonable assurance that this reported amount of GHG emission reductions for the period is fairly stated.

SGS confirms that the project is implemented as described in the validated and registered project design documents. Based on the information we have seen and evaluated, we confirm the following:

Project Title:	119.8 MW Natural Gas Based Combined Cycle Power Plant, at Tanjavur, Tamilnadu by M/S Aban Power Company Limited
UNFCCC Reference Number:	Ref No UN0999
Registered PDD and Approved Methodology Used for Verification:	Registered PDD, version 02, dated 16/12/2006 ACM0029/ version01 dated 19 May 2006
Applicable Period:	16/05/2007 to 15/06/2008
Total GHG Emission Reductions Verified:	**215,518 tCO2**

Signed on behalf of the Verification Body by Authorized Signatory

Signature: 

Name: Siddharth Yadav

Date: 25th September 2008

8. Document References

/1/ Registered PDD, dated 16/12/2006 (UN0999)
/2/ UNFCCC website - http://cdm.unfccc.int/Projects/DB/RWTUV1173779090.0/view
/3/ Monitoring Report /Version 01, dated 30/06/2008
/4/ Monitoring Report /Version 02, dated 11/08/2008 and Monitoring Report/Version 3, 24/09/2008
/5/ Emission Reduction Calculation Sheet_MP2 - ver 02
/6/ Applied Methodology AM0029, version 01, dated 19 May 2006.
/7/ Applicable Tamil Nadu State Electricity Board and GAIL India Ltd. certified monthly joint meter reading reports for the monitored period 16 May '07 to 15 June '08.
/8/ GAIL India Ltd. fortnight invoices for supply of natural gas for the monitored period 16 May '07 to 15 June '08.
/9/ Monthly (billing month wise) report of power generation, export, gas consumption.
/10/ Applicable periodic calibration reports of Energy Meters for the monitored period 16 May '07 to 15 June '08
/11/ Applicable GAIL India Ltd. certified joint calibration reports of gas flow metering system and the calibration details of master calibrators for the monitored period 16 May '07 to 15 June '08.
/12/ CO_2 Baseline Database for the Indian Power Sector, Version 3, dated 15th Dec 2007 published by the Central Electricity Authority, Ministry of Power, Govt. of India. (available at http://cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm)
/13/ Internal Audit Reports dated 14/12/2007 & 17/06/2008.
/14/ Internal monthly training schedules and records along with attendance sheet for monitored period 16 May '07 to 15 June '08
/15/ External training records for monitored period 16 May '07 to 15 June '08
/16/ ISO 14001: 2004 certificate registration no. 1210428305 TMS; Validity: Until 2009-05-07
/17/ ISO 18001: 1999 certificate registration no. 1211628305 TMS; Validity: Until 2009-06-23

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