Duerping Coal Mine Methane Utilization Project

Clean Development Mechanism (CDM)

CER Monitoring Report

Certified Emission Reductions

Monitoring Period: 6 March 2009– 26 June 2009

CDM Registration No: 1900

Date: 1 July 2009
Version 1

A project designed to meet the baseline and monitoring requirements of UN CDM Approved Consolidated Methodology

ACM0008 Version 3
"Consolidated baseline methodology for coal bed methane and coal mine methane capture and use for power (electrical or motive) and heat and/or destruction by flaring"

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1 General Project Activity Information

1.1 Title of Project Activity

Project 1900: Duerping Coal Mine Methane Utilization Project - China.

1.2 CDM Registration date and crediting period

Registration Date: 6 March 2009
Crediting Period: 10 years.

1.3 Contact Details

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1.4 Short Description of the project activity

The purpose of the project activity is the utilization and abatement of coal mine methane captured in underground coal mine workings to allow safe coal extraction at Duerping coal mine.

The project activity has installed the necessary power generation and abatement equipment; control, monitoring and safety systems; pipe-work and power connections to ensure that a high proportion of the coal mine methane that would normally be released to atmosphere is combusted. Investment in generation plant will be phased, totaling 5.1MW in year 1 and expanding progressively as gas supply is expanded up to an expected maximum of about 12.0MW. Currently the installed capacity is 5.1 MW. Three 1.7MW gensets (combined capacity of 5.1 MW) were delivered to the site in November 2008 for installation and they started operation in May 2009. Development of further phases will depend on progress with mine development, methane drainage and planned coal production.

During project development, about 15% of the gas emitted by the underground mining operations was being captured by methane drainage and 85% exhausted to the atmosphere as ventilation air methane (VAM). During the course of the project, the mine anticipates raising the capture efficiency substantially with a possible target of 40%.

The project will contribute to sustainable development by improving local air quality and reducing greenhouse gas emissions, and will not lead to the consumption of significant natural resources. There will not be any material increase in energy consumption because the pumping station has already been installed in order to comply with mine safety requirements, therefore any electricity used by the pumping station is included in the baseline. Generator noise is mitigated by sound-proof containment. Emissions from the generators will not exceed environmental standards. The waste heat from the generators will remove the need to consume coal to heat the mine intake air, further saving natural resources and contributing to improved local air quality.
The project will provide social benefits through improved health and safety for workers and economic benefits by providing a new source of clean electricity displacing coal-fired power, and heat displacing coal burning in boilers.

Technology transfer benefits will arise from the installation of state-of-the-art power generation and heat recovery equipment and associated safety and monitoring equipment and control systems.

Location of the project activity

The coal mine is located 20 km west of Taiyuan, the capital of Shanxi Province. The project site lies 8km south west of the main mine buildings. The coal mine reserves are located within the area: Latitude: North 112°14' 27"   Longitude: Eas t 37°46' 52"

Figure 1   **Location of the project activity.**

The project participants are:

Shanxi Coking Coal Group Company, a Chinese state-owned enterprise which was established under the laws of the People's Republic of China and having its registered office at Xin Jin Si Road, Taiyuan, Shanxi, PRC (hereinafter referred to as "Jiaomei").

Sindicatum Carbon Capital Ltd, a company incorporated under the laws of England and having its registered office at 33 Duke Street, London, W1U 1JY, United Kingdom (hereinafter referred to as "SCC").

1.5 Monitoring Period Covered

The monitoring period covered by this monitoring report: 6th March 2009 – 26th June 2009 (inclusive).

1.6 Methodology applied to the Project Activity

ACM0008 ver. 3 - "Consolidated baseline methodology for coal bed methane and coal mine methane capture and use for power (electrical or motive) and heat and/or destruction by flaring".
A revised Monitoring Plan has been submitted for validation and further approval, which serves as the basis for this CDM Monitoring Report.

1.7 Deviations or revisions to the registered PDD or Monitoring Plan

None

1.8 Special (accidental) events occurring during this reporting period

During the monitoring period, no accidental events occurred.

1.9 Changes since Last CER Verification

None -this is the first CER verification exercise.

2 Monitoring Plan

2.1 Parameters Monitored

The parameters monitored and the monitoring procedure applied for determination of the emission reductions is described in detail in section B.6.1 of the Project Design Document v 4.09 dated 18 February 2009. Duerping Project Design Document is available on the UNFCCC website.
http://cdm.unfccc.int/UserManagement/FileStorage/Q3PBR459OM8KI0Y6FATGX1SJW27HNC

An overview of the parameters monitored is provided in section 3 and details of the equipment used in the monitoring in Annex 1. The location of measurement devices installed is shown in Figure 2 below:

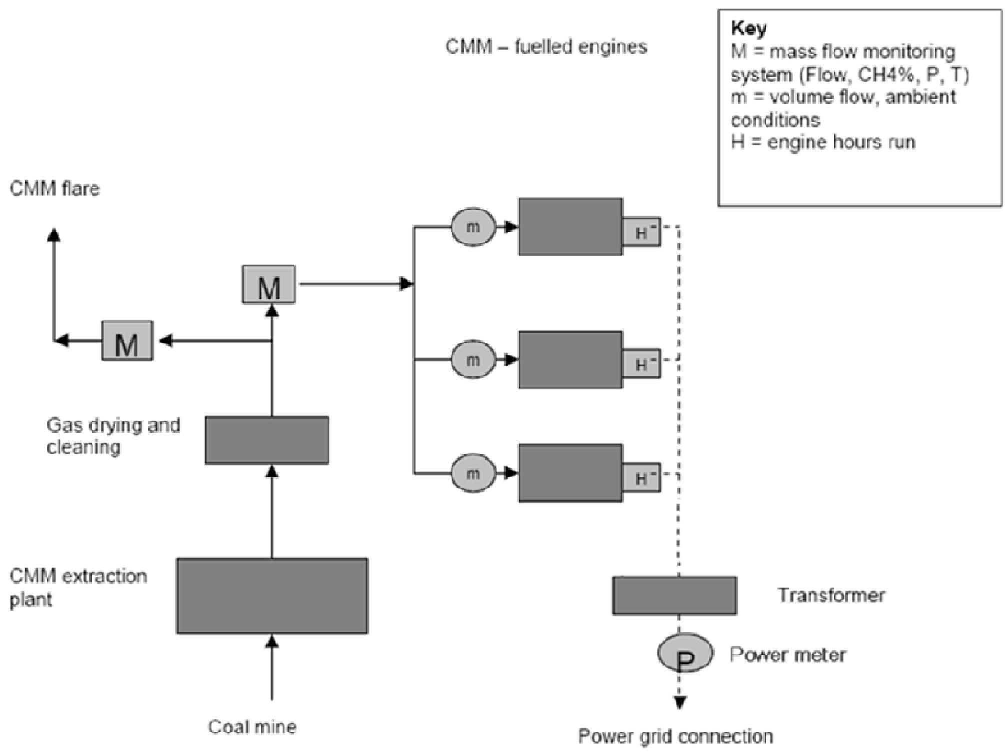

Figure 2 Location of the measurement devices

2.2 Quality Assurance /Quality Control

In order to guarantee the quality of the data and data collection system, a detailed monitoring manual has been developed and implemented. This detailed monitoring manual (available for verification by a designated operational entity (DOE)) is based upon the requirements set out in the PDD and addresses as a minimum the items listed below.

- SCC CDM engineers record the value from each CDM monitoring instrument daily using a remote web page system to verify that the readings are within the range set by the manufacturer. Gross power values are recorded by Duerping mine operators and handed to SCC CDM engineers every week. The monitoring instrument data is log daily and it is available during verification. If the incorrect value persists for more than one hour SCC CDM engineers will ask the on-site operator to check the installation of the instrument and if the problem persists SCC will contact the installation company to replace the faulty instrument with an approved calibrated instrument in the shortest time possible.

- Monthly analysis of CH4 mass flow vs Gross power to confirm the parameters used for back-calculating null CH4 mass flow are consistent month to month.

An overview of the data collection process is provided in Table 1. Detailed formulae for the calculation of emissions are presented in Section 3.

Table 1 Data collection process

Parameter	Reference	Procedure / Frequency	Registration	Check and correct primary measurements
Baseline Emissions	The baseline emissions are calculated using the formulae described in the PDD, section B6.1 - using the CDM spreadsheet	Primary data are electronically logged and stored together with keyboard entry data and processed electronically at the start of each month	CDM spreadsheet stored on SCC's Project File S-Server	The SCC project officer performs a consistency check based upon previous months. In case of irregularities data is double checked, corrected as necessary and the amendment logged
Leakage	In accordance with ACM0008 v3 no leakage is considered in the Project			

Project Emissions	The project emissions are calculated using the formulae described in the PDD, section B6.1 - using the CDM spreadsheet	Primary data are electronically logged and stored together with keyboard entry data and processed electronically at the start of each month	CDM spreadsheet stored on SCC's Project File S-Server	The SCC project officer performs a consistency check based upon previous months. In case of irregularities data is double checked, corrected as necessary and the amendment logged
Emissions Reductions	The emission reductions are calculated using the formulae described in the PDD, section B6.1 - using the CDM spreadsheet	Primary data are electronically logged and stored together with keyboard entry data and processed electronically at the start of each month	CDM spreadsheet stored on SCC's Project File S-Server	The SCC project officer performs a consistency check based upon previous months. In case of irregularities data is double checked, corrected as necessary and the amendment logged

Accuracy and calibration of instruments

All measurement devices are maintained to ensure a high level of accuracy. All meters are subject to a quality control regime that includes regular maintenance and also calibration by Shanxi Province institute of Metrology Supervision and verification.

A record is available showing the location and unique identification number of each meter, the calibration status of that meter (when last calibrated, when next due for calibration). All CDM instruments (except the Flare Thermocouples) in the plant have integrated a Serial Number which is used to track the calibration records and installation certificates. In order to guarantee the appropriate installation of calibrated thermocouples SCC provides the installation certificates of these instruments with the installation dates matching the historical performance of the flare thermocouples.

Calibration records are retained for until two years after the end of the crediting period and are available for verification by the DOE.

Archiving of data

Data is archived periodically to a secure and retrievable storage format where it will be held for the crediting period plus 2 years.

Document Control

A document control system has been introduced ensuring that the current versions of necessary documents are available at the point of use. As a part of the document control system, an internal Technical Review Process has been established to ensure the quality of all relevant documents, including the CDM Monitoring Report.

Treatment of missing or corrupted data

Where data in the on-line system are corrupted or missing whilst the plant is operating, the corrupt or missing data can be corrected and justified using installed back-up metering devices, average previous hour readings and power – gas flow correlations.

In case errors are identified, both corrective and preventive actions are taken.

Internal Audit

An audit of the data collection and QC/QA system is performed periodically, at least once per year. An internal audit has been carried out by SCC CDM Director on 29,30 and 1st July 2009. A copy of the internal report is available for verification by the DOE.

Internal Training

Relevant process operators and CDM technical staff have received training to ensure compliance with the tasks and procedures set out in the monitoring plan.

3 Formulae used to calculate Emission Reductions

The formulae used for calculation are in accordance with the approved consolidated methodology CDM-EB ACM0008 version 03 "Consolidated baseline methodology for coal bed methane and coal mine methane capture and use for power (electrical or motive) and heat and/or destruction by flaring".

The above methodology draws on:

- ACM0002 Version 06 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources"
- "Tool to determine project emissions from flaring gases containing methane"

3.1 Baseline Emissions

The formulae used for determination of the baseline emissions are described in section B.7.1 of the Project Design Document v4.09 dated 18 February 2009. Duerping Project Design Document is available on the UNFCCC website.
http://cdm.unfccc.int/UserManagement/FileStorage/Q3PBR459OM8KI0Y6FATGX1SJW27HNC

Baseline emissions are calculated as follows:

$$BE_y = BE_{MD,y} + BE_{MR,y} + BE_{Use,y} \quad \textbf{(1)}$$

Where

BE_y	Baseline emissions in year y (tCO_2e)
$BE_{MD,y}$	Baseline emissions from destruction of methane in the baseline scenario in year y (tCO_2e)

$BE_{MR,y}$	Baseline emissions from release of methane into the atmosphere in year y that is avoided by the project activity (tCO_2e)
$BE_{Use,y}$	Baseline emissions from the production of power, heat or supply to gas grid replaced by the project activity in year y (tCO_2e)

$BE_{MD,y}$ (baseline emissions from the destruction of methane in the baseline scenario) are zero.

$$BE_{MRy} = GWP_{CH4} \times [\sum_i (CBMe_{i,y} - CBM_{BL\,i,y}) + \sum_i (CMM_{PJi,y} - CMM_{BL\,i,y}) + \sum_i (PMM_{PJi,y} - PMM_{BL\,i,y})] \quad (2)$$

Where,

$BE_{MR,y}$	Baseline emissions from release of methane into the atmosphere in year y that is avoided by the project activity (tCO_2e)
I	Use of methane (flaring, power generation, heat generation, supply to gas grid to various combustion end uses)
$CBMe_{i,.y}$	Eligible CBM captured, sent to and destroyed by use *i* in the project for year y (expressed in tCH_4) = 0
$CBM_{BLi,y}$	CBM that would have been captured, sent to and destroyed by use *i* in the baseline scenario in the year y (expressed in tCH_4) = 0
$CMM_{PJ,i,y}$	Pre-mining CMM captured, sent to and destroyed by use *i* in the project activity in year y (expressed in tCH_4)
$CMM_{BL,i,y}$	Pre-mining CMM that would have been captured, sent to and destroyed by use *i* in the baseline scenario in year y (expressed in tCH_4) = 0
$PMM_{PJ,i,y}$	post-mining CMM captured, sent to and destroyed by use *i* in the project activity in year y (tCH_4)
$PMM_{BLi,,y}$	post-mining CMM that would have been captured, sent to and destroyed by use *i* in the baseline scenario in year y (tCH_4) = 0
GWP_{CH4}	Global warming potential of methane (21 tCO_2e/tCH_4)

In practice, the pre-mining and post-mining methane are indistinguishable, being extracted through the same pumping system in proportions that vary depending on mining activities, atmospheric pressure changes and day to day management of the ventilation systems.

The baseline emissions are determined ex post by measuring the methane emitted from the methane drainage system at the point where it enters the equipment.

Baseline emissions from grid power

The CEF_electricity is calculated as per ACM0002 v6, from the average of the operating margin and build margin in the North China Power Grid. The build margin is calculated from the newly installed capacity since 1999, which represents just over 20% of the total grid.

CEF_OM	1.1208	China Electric Power Yearbook 2006
CEF_BM	0.9397	China Electric Power Yearbook 2006

According ACM0002, the baseline emission factor is the simple average of BM and OM:

1.1208+0.9397/ 2 = 1.03025

Emission factor for heat generation

$$EF_{heat,y} = \frac{EF_{CO2,i}}{Eff_{heat}} \times \frac{44}{12} \times \frac{1TJ}{1000GJ}$$

The baseline scenario includes existing heat generation that is replaced by the project activity. The Emissions Factor for displaced heat generation is calculated as follows:

where:

$EF_{heat,y}$	Emissions factor for heat generation (tCO_2/GJ)	**(3)**
$EF_{CO2,i}$	CO_2 emissions factor of fuel used in heat generation (tC/TJ)	
Eff_{heat}	Boiler efficiency of the heat generation (%)	
44/12	Carbon to Carbon Dioxide conversion factor	
1/1000	TJ to GJ conversion factor	

Boiler efficiency is taken as 100%

Total emissions displaced by use of coal mine methane

There are no pre-mining activities (including CBM) or post-mining activities.

There is no vehicle fuel used by this project, and therefore $VFUEL_y$ x EF_V is not considered. Also, heat provided by the boilers is waste heat, and therefore creates zero emissions so EF_{HEAT} is also not considered. Therefore, $PBE_{Use,y}$ is defined for this project as:

$$PBE_{Use,y} = GEN_{,y} \times EF_{ELEC} + HEAT_y \times EF_{HEAT} \qquad (5)$$

Where,

$PBE_{Use,y}$	Potential total baseline emissions from the production of power or heat replaced by the project activity in year y (tCO_2e)
GEN_y	Electricity generated by project activity in year y (MWh), including through the use of CBM
EF_{ELEC}	Emissions factor of electricity (grid, captive or a combination) replaced by project (tCO_2/MWh) = 1.03025 (see above)
$HEAT_y$	Heat generation by project activity in year y (GJ), including through the use of CBM

ERy = BEy – PEy – Ly **(6)**

Where
ERy = Emission reduction in year y
BEy = baseline emissions in year y
PEy = project emissions in year y
Ly = Leakage in year y = 0

3.2 Project Emissions

The formulae used for determination of the project emissions are described in section B.7.1 of the Project Design Document v4.09 dated 18 February 2009. Duerping Project Design Document is available on the UNFCCC website.
http://cdm.unfccc.int/UserManagement/FileStorage/Q3PBR459OM8KI0Y6FATGX1SJW27HNC

Project emissions are calculated as follows:

$$PE_y = PE_{ME} + PE_{MD} + PE_{UM} \quad \textbf{(9)}$$

where:

PE_y Project emissions in year y (tCO_2e)
PE_{ME} Project emissions from energy use to capture and use methane (tCO_2e)
PE_{MD} Project emissions from methane destroyed (tCO_2e)
PE_{UM} Project emissions from un-combusted methane (tCO_2e)

$PE_{ME} = 0$ because the project activity simply takes the methane already captured and released in the baseline scenario. No additional energy is utilised.

$$PE_{MD} = (MD_{FL} + MD_{ELEC} + MD_{HEAT} + MD_{GAS}) \times ((1-r) \times CEF_{CH4} + r \times CEF_{NMHC}) \quad \textbf{(10)}$$ [1]

with:

$$r = PC_{NMHC} / PC_{CH4} \quad \textbf{(11)}$$

where:[2]

PE_{MD} Project emissions from CMM/CBM destroyed (tCO_2e)
MD_{FL} Methane destroyed through flaring (tCH_4)
MD_{ELEC} Methane destroyed through power generation (tCH_4)
MD_{HEAT} Methane destroyed through heat generation (tCH_4) = 0
MD_{GAS} Methane destroyed after being supplied to gas grid or for vehicle use (tCH_4) = 0
CEF_{CH4} Carbon emission factor for combusted methane (2.75 tCO_2e/tCH_4)

[1] A factor of (1-r) is included to correctly weight the CEF by percentage of the respective gases
[2] Note that throughout this baseline methodology, it is assumed that measured quantities of coal mine gas are converted to tonnes of methane using the measured methane concentration of the coal mine gas and the density of methane.

CEF_{NMHC}	Carbon emission factor for combusted non methane hydrocarbons (the concentration varies and, therefore, to be obtained through periodical analysis of captured methane) ($tCO_2eq/tNMHC$)
r	Relative proportion of NMHC compared to methane
PC_{CH4}	Concentration (in mass) of methane in extracted gas (%)
PC_{NMHC}	NMHC concentration (in mass) in extracted gas (%)

Not all of the methane sent to generate power, flare and heat will be combusted, so a small amount will escape to the atmosphere. These emissions are calculated using the following:

$$PE_{UM} = GWP_{CH4} \times \sum_i MM_i \times (1 - Eff_i) \qquad \textbf{(12)}$$

where:

PE_{UM}	Project emissions from un-combusted methane (tCO_2e)
GWP_{CH4}	Global warming potential of methane (21 tCO_2e/tCH_4)
I	Use of methane (flaring, power generation, heat generation, supply to gas grid to various combustion end uses)
MM_i	Methane measured sent to use i (tCH_4)
Eff_i	Efficiency of methane destruction in use i (%)

Eff_{ELEC} (Efficiency of methane destruction/oxidation in power plant) will be taken as 99.5% from the 2006 Revised IPCC Guidelines for efficiency of methane oxidation/destruction in a power plant and as prescribed in ACM0008 version 03.

To determine project emissions from flaring gases containing methane

For the enclosed flares: Option (a) in the flaring tool of a 90% efficiency default value is used to determine the flare efficiency. Continuous monitoring of compliance with manufacturer's specification of flare (temperature, flow rate of residual gas at the inlet of the flare) must be performed. If in a specific hour any of the parameters are out of the limit of manufacturer's specifications, a 50% default value for the flare efficiency is used for the calculations for the specific hour.

Applicable steps are:
STEP 1: Determination of the mass flow rate of the residual gas that is flared
STEP 5: Determination of methane mass flow rate of the residual gas on a dry basis
STEP 6: Determination of the hourly flare efficiency
STEP 7: Calculation of annual project emissions from flaring based on measured hourly values or based on default flare efficiencies.

Option (b) Continuous monitoring of the methane destruction efficiency of the flare (flare efficiency).

The project activity follows the approach described as Option (a) using of 90% default flare efficiency. The manufacturer's specifications for the operation of the flare and the required data and procedures to monitor the flare operation are documented in the Project Design Document Monitoring Plan.

STEP 1. Determination of the mass flow rate of the residual gas that is flared
This step calculates the residual gas mass flow rate in each hour *h*, based on the volumetric flow rate and the density of the residual gas. The density of the residual gas is determined using the simplified approach as described in the methodology where only the volumetric fraction of methane is measured and the difference to 100% is considered as nitrogen.

$$FM_{RG,h} = \rho_{RG,n,h} \times FV_{RG,h} \quad (1)$$

Where:

Variable	SI Unit	Description
$FM_{RG,h}$	kg/h	Mass flow rate of the residual gas in hour *h*
$\rho_{RG,n,h}$	kg/m^3	Density of the residual gas at normal conditions in hour *h*
$FV_{RG,h}$	m^3/h	Volumetric flow rate of the residual gas in dry basis at normal conditions in the hour *h*

and:

$$\rho_{RG,n,h} = \frac{P_n}{\frac{R_u}{MM_{RG,h}} \times T_n} \quad (2)$$

Where:

Variable	SI Unit	Description
$\rho_{RG,n,h}$	kg/m^3	Density of the residual gas at normal conditions in hour *h*
P_n	Pa	Atmospheric pressure at normal conditions (101 325)
R_u	$Pa.m^3/kmol.K$	Universal ideal gas constant (8 314)
$MM_{RG,h}$	kg/kmol	Molecular mass of the residual gas in hour *h*
T_n	K	Temperature at normal conditions (273.15)

and:

$$MM_{RG,h} = \sum_i (fv_{i,h} * MM_i) \quad (3)$$

Where:

Variable	SI Unit	Description
$MM_{RG,h}$	kg/kmol	Molecular mass of the residual gas in hour *h*
$fv_{i,h}$	-	Volumetric fraction of component *i* in the residual gas in the hour *h*
MM_i	kg/kmol	Molecular mass of residual gas component *i*
I		The components CH_4, CO, CO_2, O_2,H_2, N_2

STEP 2. Determination of the mass fraction of carbon, hydrogen, oxygen and nitrogen in the residual gas

Determine the mass fractions of carbon, hydrogen, oxygen and nitrogen in the residual gas, calculated from the volumetric fraction of each component *i* in the residual gas (taken as only methane and nitrogen in accordance with the simplification in the methodology), as follows:

$$fm_{j,h} = \frac{\sum_{i} fv_{i,h} \cdot AM_j \cdot NA_{j,i}}{MM_{RG,h}} \qquad (4)$$

Where:

Variable	SI Unit	Description
$fm_{j,h}$	-	Mass fraction of element *j* in the residual gas in hour *h*
$fv_{i,h}$	-	Volumetric fraction of component *i* in the residual gas in the hour *h*
AM_j	kg/kmol	Atomic mass of element *j*
$NA_{j,i}$	-	Number of atoms of element *j* in component *i*
$MM_{RG,h}$	kg/kmol	Molecular mass of the residual gas in hour *h*
j		The elements carbon, hydrogen, oxygen and nitrogen
i		The components CH_4, CO, CO_2, O_2,H_2, N_2

STEP 5. Determination of methane mass flow rate in the residual gas

The quantity of methane in the residual gas flowing into the flare is the product of the volumetric flow rate of the residual gas (*FVRG,h*), the volumetric fraction of methane in the residual gas (*fvCH4,RG,h*) and the density of methane (ρ*CH4,n,h*) in the same reference conditions (normal conditions and dry or wet basis). If the residual gas moisture is significant (temperature greater than 60ºC), the measured flow rate of the residual gas that is usually referred to wet basis should be corrected to dry basis due to the fact that the measurement of methane is usually undertaken on a dry basis (i.e. water is removed before sample analysis). In this case the gas temperature is less than 60oC and measurements are made as received, ie wet.

$$TM_{RG,h} = FV_{RG,h} \times fv_{CH4,RG,h} \times \rho_{CH4,n} \qquad (13)$$

Where:

Variable	SI Unit	Description
$TM_{RG,h}$	kg/h	Mass flow rate of methane in the residual gas in the hour *h*
$FV_{RG,h}$	m^3/h	Volumetric flow rate of the residual gas in dry basis at normal conditions in hour *h*
$fv_{CH4,RG,h}$	-	Volumetric fraction of methane in the residual gas on dry basis in hour *h* (NB: this corresponds to $fv_{i,RG,h}$ where *i* refers to methane).
$\rho_{CH4,n}$	kg/m^3	Density of methane at normal conditions (0.716)

STEP 6. Determination of the hourly flare efficiency

The project has an enclosed flare and the flare efficiency in the hour *h* (h*flare,h*) has been calculated after applying the following conditions:

- 0% if the temperature in the exhaust gas of the flare (Tflare) is below 500 °C for more than 20 minutes during the hour *h*.
- 50%, if the temperature in the exhaust gas of the flare (Tflare) is above 500 °C for more than 40 minutes during the hour *h,* but the manufacturer's specifications on proper operation of the flare are not met at any point in time during the hour *h*.
- 90%, if the temperature in the exhaust gas of the flare (Tflare) is above 500 °C for more than 40 minutes during the hour *h* and the manufacturer's specifications on proper operation of the flare are met continuously during the hour *h*.

STEP 7. Calculation of annual project emissions from flaring

Project emissions from flaring are calculated as the sum of emissions from each hour *h*, based on the methane flow rate in the residual gas (*TMRG,h*) and the flare efficiency during each hour *h* (h*flare,h*), as follows:

$$PE_{flare,y} = \sum_{h=1}^{8760} TM_{RG,h} \times \left(1 - \eta_{flare,h}\right) \times \frac{GWP_{CH4}}{1000} \quad (15)$$

Where:

Variable	SI Unit	Description
$PE_{flare,y}$	tCO_2e	Project emissions from flaring of the residual gas stream in year *y*
$TM_{RG,h}$	kg/h	Mass flow rate of methane in the residual gas in the hour *h*
$\eta_{flare,h}$	-	Flare efficiency in hour *h*
GWP_{CH4}	tCO_2e/tCH_4	Global Warming Potential of methane valid for the commitment period

3.3 Leakage

There is no baseline thermal energy use and therefore no leakage to consider in this methodology (see section B.6.1 of the Project Design Document v4.09 dated 18 February 2009. Duerping Project Design Document is available on the UNFCCC website.
http://cdm.unfccc.int/UserManagement/FileStorage/Q3PBR459OM8KI0Y6FATGX1SJW27HNC

3.4 Emission Reductions

The formula used for determination of the emission reductions is described in section B.7.1 of the Project Design Document v4.09 dated 18 February 2009. Duerping Project Design Document is available on the UNFCCC website.
http://cdm.unfccc.int/UserManagement/FileStorage/Q3PBR459OM8KI0Y6FATGX1SJW27HNC

Emission reductions are calculated as the difference between baseline and project emissions for the same period y:

$$ER_y = BE_y - PE_y - LE_y \tag{13}$$

where:

ER_y	Emissions reductions of the project activity during the year *y* (tCO_2e)
$BE_{,y}$	Baseline emissions during the year *y* (tCO_2e)
PE_y	Project emissions during the year *y* (tCO_2e)
LE_y	Leakage emissions in year y (tCO_2e) = 0

4 Calculation of Emission Reductions

The data required to calculate baseline emissions, project emissions and leakage emissions is transferred to a protected spreadsheet on a secure, maintained server for electronic computation of the emission reductions using the formulae described in the previous section.

A hard copy sample of the CDM spreadsheet, check calculations and a temporary computer access code to facilitate inspection of the full data and algorithms will be provided to the DOE for verification purposes.

The results of the monitoring process for the monitoring period stated are summarized below.

4.1 Baseline Emissions

Period		BE_MD	BE_MR	BE_USE	BE
From	To	(tCO2e)	(tCO2e)	(tCO2e)	
6 March 09	26 March 09	0	5878	1600	7478
26 March 09	26 April 09	0	13280	3182	16462
26 April 09	26 May 09	0	13589	2857	16446
26 May 09	26 June 09	0	14753	2473	17226
TOTALS		0	47500	10112	57612

4.2 Project Emissions (PE)

Period		PE_ME	PE_MD	PE_UM	PE
From	To	(tCO2e)	(tCO2e)	(tCO2e)	
6 March 09	26 March 09	0	759	75	834
26 March 09	26 April 09	0	1684	419	2103
26 April 09	26 May 09	0	1706	560	2266
26 May 09	26 June 09	0	1834	744	2578
TOTALS		0	5983	1798	7781

During the monitoring period no other fossil fuels have been consumed.

NMHC concentrations have been below 1% during the whole monitoring period and, in accordance with the methodology, can be ignored for the emission reduction calculations. See gas analysis laboratory results in Annex 2 (originals will be provided during verification).

4.3 Leakage

Not applicable (LE=0)

4.4 Emission Reductions ($tCO2_e$)

Period		BE	PE	LE	ER
From	To	(tCO2e)	(tCO2e)	(tCO2e)	
6 March 09	26 March 09	7478	834	0	6644
26 March 09	26 April 09	16462	2103	0	14359
26 April 09	26 May 09	16446	2266	0	14180
26 May 09	26 June 09	17226	2578	0	14648
TOTALS		57612	7781	0	49831

Annex 1.a Monitoring equipment type and location

Application	Equipment	Type	Serial No.	Location
CMM supply to engines	V-cone flow meter	Kingsway Shanghai KVW08IIAB24FWN	7092005	Engine 1
	Differential pressure sensor	Rosemount 3051CD1A22A1AM5B4K5	4879836/FE-105	Engine 1
	V-cone flow meter	Kingsway Shanghai KVW08IIAB24FWN	7092003	Engine 2
	Differential pressure sensor	Rosemount 3051CD1A22A1AM5B4K5	4879835/FE-103	Engine 2
	V-cone flow meter	Kingsway Shanghai KVW08IIAB24FWN	7092004	Engine 3
	Differential pressure sensor	Rosemount 3051CD1A22A1AM5B4K5	4870527/FE-104	Engine 3
	Methane concentration meter	Guardian plus model 97460	26060	Pre-treatment container 2
	Gas temperature sensor	Anhui Tiankang WZP-240	no SN	Pre-treatment container 2
	Gas pressure sensor	Hefei Keheng, KH-801AFY	72848	Pre-treatment container 2
CMM supply to enclosed flare	V-cone flow meter	Kingsway Shanghai KVW10IIAB24FWN	7102301	Flare pipe (1)
	Differential pressure sensor	Rosemount 3051CD1A22A1AM5B4K5	4870526/FE-107	Flare pipe (1)
	V-cone flow meter	Kingsway Shanghai KVW10IIAB24FWN	7102302	Flare pipe ((2)
	Differential pressure sensor	Rosemount 3051CD1A22A1AM5B4K5	4870528/FE-106	Flare pipe ((2)
	Methane concentration meter	Guardian plus model 97460	26064	Pre-treatment container 1
	Gas temperature sensor	Anhui Tiankang WZPK-2506-250P/T1	07097988	Flare manifold
	Gas pressure sensor	Rosemount TG1A2B21AB4E5M5	4793856	Flare manifold
	Flame temperature thermocouple	Nanjing Wanda N type WRNK-331	no SN	Flare stack
Barometric pressure	Pressure sensor	Rosemount 3051TA1A2B21JE5Q4	4980063	Inside Pre-treatment PLC container
Power supply to grid	Net power output meter	Jiang Shu Lin Yang Electronics Co.Ltd. Cumulative power meter	0040	Mine sub-station building
Heat from engines sent to shaft heater	V-cone oil flow meter	KVW06IIAB24FWN	7092002	Distribution manifold
	Oil temperature out	Anhui Tiankang WZPK-2606-200P/T1	070907985	Distribution manifold
	Oil temperature return	Anhui Tiankang WZPK-2606-200P/T1	070907964	Distribution manifold

Annex 1.b Monitoring equipment calibration

Item	Name	Instrument type	scale	calibration certificate	calibration date	Next date for calibration
1	T gas flare	WZPK（Pt100）	0-100 ^{0}C	JZRX 20088112	2008-8-11	2009-8-11
2	T gas engine	WZP-240（Pt100）	-200-450 ^{0}C	JZRX 20088111	2008-8-11	2009-8-11
3	P gas flare	Rosemount TG1A2B21AB4E5M5	0-30KPa	JZYL20087001	2008-8-11	2009-8-11
4	P gas engine	KH- AFY 801	0-40KPa	JZYL20087002	2008-8-11	2009-8-11
5	flare CH%	Guardian plus, model:97460	0-100%	JZYL20087005	2008-8-11	2009-8-11
6	engine CH4%	Guardian plus, model:97460	0-100%	JZYL20087003	2008-8-11	2009-8-11
7	CH4% Spare	Guardian plus, model:97460	0-100%	JZYL20087004	2008-8-11	2009-8-11
8	V-cone engine 1	摩尔肯维斯（上海）有限公司 KVW08IIAB24FWN	0 – 1,900 m3/hr	TE08-JZ0003	2008-8-12	2010-8-12
9	DP engines 1	Rosemount 3051CD1A22A1AM5B4K5	0-6.22KPa	TE08-JZ0010	2008-8-12	2009-8-12
10	V-cone engine 2	摩尔肯维斯（上海）有限公司 KVW08IIAB24FWN	0 – 1,900 m3/hr	TE08-JZ0005	2008-8-12	2010-8-12
11	DP engines 2	Rosemount 3051CD1A22A1AM5B4K5	0-6.22KPa	TE08-JZ0006	2008-8-12	2009-8-12
12	V-cone engine 3	摩尔肯维斯（上海）有限公司 KVW08IIAB24FWN	0 – 1,900 m3/hr	TE08-JZ0004	2008-8-12	2010-8-12

13	DP engines 3	Rosemount 3051CD1A22A1AM5B4K5	0-6.22KPa	TE08-JZ0008	2008-8-12	2009-8-12
14	V-cone 1# for flare	KVW10IIAB24FWN	0-3,000 m3/hr	TE08-JZ0002	2008-8-12	2010-8-12
15	DP 1# for flare	Rosemount 3051CD1A22A1AM5B4K5	0-6.22KPa	TE08-JZ0007	2008-8-12	2009-8-12
16	V-cone 2# for flare	KVW10IIAB24FWN	0-3,000 m3/hr	TE08-JZ0001	2008-8-12	2010-8-12
17	DP 2# for flare	Rosemount 3051CD1A22A1AM5B4K5	0-6.22KPa	TE08-JZ0009	2008-8-12	2009-8-12
18	DP for engines	Rosemount 3051CD1A22A1AM5B4K5	0-6.22KPa	TE08-JZ0012	2008-9-18	2009-9-18
19	Flare thermocouple	Nanjing Wanda N type WRNK-331	0-1300 ^{0}C	Several Thermocouples were installed at different dates. Calibration and installation certificates to be presented during Verification		
20	Oil outlet T	WZPK（Pt100）	0-300 ^{0}C	JZRX 20088114	2008-8-11	2009-8-11
21	Oil return T	WZPK（Pt100）	0-200 ^{0}C	JZRX 20088113	2008-8-11	2009-8-11
22	V-cone for oil pipe	KVW06IIAB24FWN	0-62.2KPa	TE08-JZ0013	2008-11-16	2010-11-16
23	DP for oil pipe	Rosemount CD1A22A1AM5B4K5	0-62.2KPa	JZYL20087008	2008-11-18	2009-11-18
24	Absolute pressure for flare	Rosemount TA1A2B21JE5Q4	0-141.33KPa	JZYL20087006	2008-10-09	2009-10-09
25	Absolute pressure for engine	Rosemount TA1A2B21JE5Q4	0-141.33KPa	JZYL20087007	2008-10-09	2009-10-09
26	Power meter	DNSD71		JZDN20081018	2008-8-11	2009-8-11

Annex 2 Gas analysis Duerping drainage station results by TES Bretby

Date Sampled: 15 & 20 January 2009 Date Received: 27 January 2009 Report No. 38607
Date Analysed: 27 January 2009 Site: **DUERPING**

TUBE NO.	**SAMPLE REF**	**Analysis % v/v**							
		CO_2	**CH_4**	**O_2**	**CO**	**C_2H_6**	**C_3H_8**	**n-C_4H_{10}**	**n-C_5H_{12}**
SCC2	Duerping Drainage Station	0.52	38.0	11.07	0.0010	0.03	<0.02	<0.02	<0.02
Accuracy of Analytical Method		±0.02	±1.0	±0.05	±0.0001	±0.02	±0.02	±0.02	±0.02
Method of Analysis		1	1	2	1	3	3	3	3

Method of Analysis: 1. Infra Red 3. G.C. – F.I.D

2. Paramagnetic 4. G.C. – T.C.D. Analyst: I Thornewill

Customer Analytical Requirements CO_2, CH_4, O_2, CO, C_2H_6, C_3H_8, C_4H_{10}, C_5H_{12}	By Letter	Authorised by: I Thornewill

Issue Date: 1 July, 2009

Date Sampled: 26 February 2009/ 6 and 13 March
Date Analysed: 17 March 2009
Date Received: 17 March 2009
Site: **DUERPING**
Report No. 38879

TUBE NO.	**SAMPLE REF**	**Analysis % v/v**							
		CO_2	**CH_4**	**O_2**	**CO**	**C_2H_6**	**C_3H_8**	**n-C_4H_{10}**	**n-C_5H_{12}**
4	Drainage Station (Inlet) (26 Feb 09)	1.14	39.0(d)	9.62	0.0010	0.03	<0.02	<0.02	<0.02
1	Drainage Station (Outlet) (26 Feb 09)	1.08	37.0(d)	9.76	0.0010	0.04	<0.02	<0.02	<0.02
8	Pre Treatment Inlet (26 Feb 09)	1.12	37.0(d)	9.73	0.0010	0.04	<0.02	<0.02	<0.02
2	Pre treatment Inlet (26 Feb 09)	1.10	37.0(d)	9.68	0.0010	0.03	<0.02	<0.02	<0.02
7	Pre treatment Inlet (6 March 2009)	X	30.0(d)	X	X	0.03	<0.02	<0.02	<0.02
3	Middle Station (13 March2009)	0.16	0.50(a)	20.46	0.0002	<0.02	<0.02	<0.02	<0.02
Accuracy of Analytical Method		±0.02	a±0.2 d±1.0	±0.05	±0.0001	±0.02	±0.02	±0.02	±0.02
Method of Analysis		1	1	2	1	3	3	3	3

Method of Analysis: 1. Infra Red 3. G.C. – F.I.D
2. Paramagnetic 4. G.C. – T.C.D.

Analyst: I Thornewill

Customer Analytical Requirements CO_2, CH_4, O_2, CO, C_2H_6, C_3H_8, C_4H_{10}, C_5H_{12}	By Letter	Authorised by: I Thornewill

Issue Date: 1 July, 2009