Monitoring report form
(Version 05.1)

Complete this form in accordance with the Attachment "Instructions for filling out the monitoring report form" at the end of this form.

MONITORING REPORT		
Title of the project activity	Duerping Coal Mine Methane Utilization Project	
UNFCCC reference number of the project activity	1900	
Version number of the monitoring report	01	
Completion date of the monitoring report	15/06/2015	
Monitoring period number and duration of this monitoring period	10 01/03/2014 – 31/05/2015	
Project participant(s)	Shanxi Coking Coal Group Company Ltd Sindicatum Carbon Capital Ltd.	
Host Party	P. R. China	
Sectoral scope(s)	8, 10	
Selected methodology(ies)	ACM0008: Consolidated methodology for coal bed methane and coal mine methane capture and use for power (electrical or motive) and heat and/or destruction by flaring--- version 3.0	
Selected standardized baseline(s)	Standard baseline(s) is not applicable.	
Estimated amount of GHG emission reductions or net GHG removals by sinks for this monitoring period in the registered PDD	528,281 tCO_2e	
Total amount of GHG emission reductions or net GHG removals by sinks achieved in this monitoring period	GHG emission reductions or net GHG removals by sinks reported up to 31 December 2012	GHG emission reductions or net GHG removals by sinks reported from 1 January 2013 onwards
	Not applicable	528,281 tCO_2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

The purpose of the project activity is the utilization and abatement of coal mine methane (CMM) 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 was phased. Three 1.7 MW gensets (combined capacity of 5.1 MW) were delivered to the site in November 2007 for installation and they started operation in May 2008. Another four 1.7MW gensets (combined capacity of 6.8 MW) were delivered to the site in October 2009 for installation and started operation in November 2010. The total combined capacity of the plant is 11.9 MW (5.1 MW Phase 1 plus 6.8 MW Phase 2). This matches the final capacity of nearly 12.0 MW stated within the registered PDD. There will be no development of further phases.

Waste heat from the exhaust of the generators will be used to provide heat to warm the intake of the mine during the winter months/heating season. There are two heating seasons within the monitoring period during which emission reductions were generated heat displacement. The first heating season covered 1st March 2014 to 18th April 2014 and the second heating season started on 2nd November 2014 and lasted until 20th April 2015.
The total emission reductions achieved in this monitoring period are 528,281 tCO2e.

A.2. Location of project activity

The coal mine is located 20 km west of Taiyuan, the capital of Shanxi Province of the People's Republic of China.

The project site lies 8 km south west of the mine. The coal mine reserves are located within the area: Latitude: North 37° 46' 52" Longitude: East 112° 14' 27"

Figure A.2-1 Location of the project activity

A.3. Parties and project participant(s)

Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate whether the Party involved wishes to be considered as project participant (yes/no)
Party A (host): People's Republic of China	Public entity A: Shanxi Coking Coal Group Company Ltd.	No
Party B: United Kingdom of Great Britain and Northern Ireland	Private entity B: Sindicatum Carbon Capital Ltd.	No

A.4. Reference of applied methodology and standardized baseline

- ACM0008: Consolidated methodology for coal bed methane and coal mine methane capture and use for power (electrical or motive) and heat and/or destruction by flaring--- version 3.0;
- ACM0002 Version 06 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources"
- "Tool for the demonstration and assessment of additionality" Version 4
- "Tool to determine project emissions from flaring gases containing methane"

The standardized baseline is not applicable to the project activity.

A.5. Crediting period of project activity

The fixed 10 years crediting period is chosen for the project activity. The starting date of the crediting period is 06/03/2009 which is the date of registration.

A.6. Contact information of responsible persons/entities

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Fuji Xerox Towers
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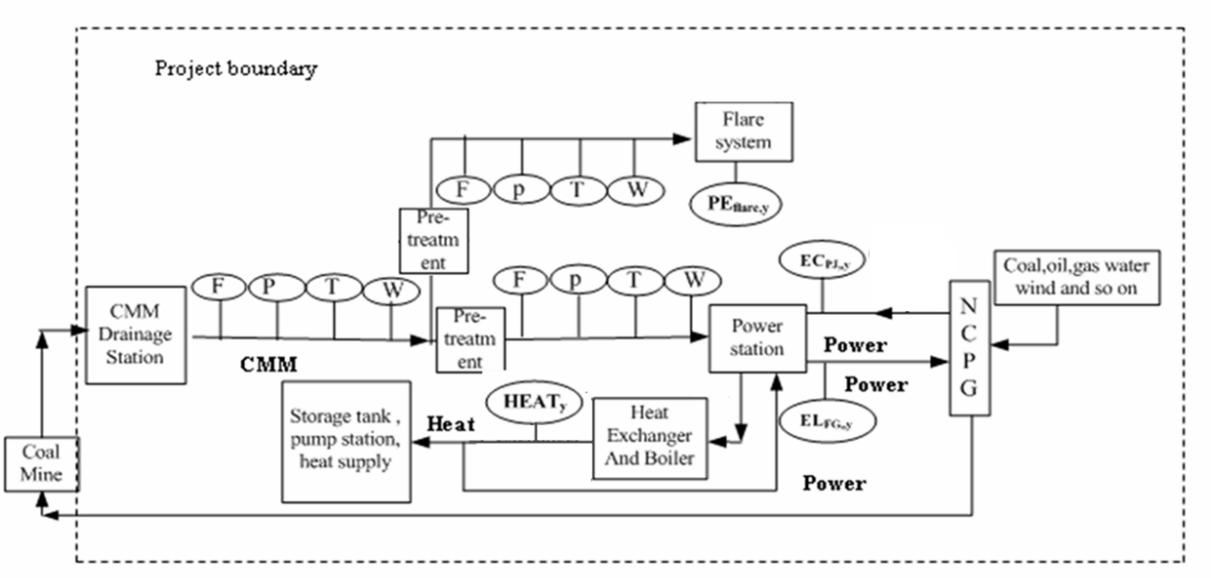
SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

This project involves container-type methane pre-treatment equipment, generator sets, power distribution system, an enclosed flare as well as relevant monitoring meters. Detailed information is as the follows:



F = Gas flow meter
P = Gas pressure
T = Gas temperature
W = Methane concentration

$EC_{PJ,y}$ = Electricity consumed
$EL_{FG,y}$ = Electricity generated
$PE_{flare,\ y}$ = Project emissions flare
NCPG = North China power grid

Figure B.1-1 Flow diagram and project boundary

1. Generator sets

Generator sets adopted by the project activity are manufactured by Deutz from Germany. Technical specifications of the generator sets are shown in Table B.1-1.

Table B.1-1 Technology specifications generator sets

Items	Parameter
A. Gas engine	
Sets	7
Model	TCG 2020V20
Cylinder numbers	20
Exhaust temperature	442°C
Rated rotational speed	1,500rpm
Manufacturer	Deutz
B. Generator	
Sets	7
Model	DIG 130k/4
Rated capacity	1,750kW
Output voltage	6.3kV
Rated frequency	50Hz
Rated rotational speed	1,500rpm
Power generating efficiency	41.6%
Total efficiency	84.5%
Life time of the gensets	>30 years

2. Waste heat recovery system

The heat will be recovered from two sections of the project activity, one is the engine water cooling system (no monitoring process associated with this heat displacement) and another is the flue gas (ER calculated from continuous monitoring of hot oil circuit during winter/heating season.

The excess heat from the cylinder cooling system will be recovered by the engine heat exchangers and provide hot water to the nearby drainage station heating system during winter months. This heat supply is not monitored and therefore no ER calculated as a consequence of the heat displacement.

Table B.1-2 Technical specifications for engine heat exchanger

Manufacturer	Incorporated in Deutz engines
Model	XG-40
Sets	7
Water flow rate	85t/h
Temperature of inlet water	70°C
Temperature of outlet water	78.5°C
Heat recovery capacity	850kW

The heat from the engine flue gas will be recovered by the flue gas/oil heat exchanger and then the heated oil will be transferred (in a closed circuit) to the coal mine shaft air intake during winter months by means of an oil/air heat exchanger.

Table B.1-3 Technical specifications for flue gas/oil heat exchanger

Manufacturer	Shanghai Eagle New Technology Engineering Co. Ltd
Sets	7
Model	EGS0.7-1.0/160/200-FF
Temperature of inlet gas	442°C
Temperature of outlet gas	≤180°C
Temperature of inlet oil	160°C
Temperature of outlet oil	200°C
Flow rate of inlet flue gas	9,480kg/h
Rated heat supply capacity	742kW

Table B.1-4 Technical specifications for oil/air heat exchanger

Manufacturer	Shanghai Eagle New Technology Engineering Co. Ltd
Sets	3
Model	EGS2-1.0/200/160-FF
Temperature of inlet air	-25°C
Temperature of outlet air	120°C
Temperature of inlet oil	200°C
Temperature of outlet oil	160°C
Flow rate of air	38,000Nm^3/h
Rated heat supply capacity	2,060kW

3. Flaring system

The surplus CMM that can't be utilized by gensets and CMM with CH_4 concentrations in the range of 25-30% will be destroyed by the enclosed flare. The combination of power generation and flaring will optimize the utilization of CMM.

The temperature of the flue gas of the enclosed flare will be continuously monitored in accordance with "Tool to determine project emissions from flaring gases containing methane" in order to ensure that the flare is in normal operation. Detailed information on the specifications of the enclosed flare is described below:

Table B.1-5 Technical specifications for the enclosed flare

Manufacturer	Nanjing Shunfeng-Pioneer Air & Gas Purification Co. Ltd
Sets	1
Capacity	300-5,000 Nm^3/h
Methane concentration in CMM	>25%
Flare temperature	500-1,350 ℃
Methane combustion efficiency (%)	>90%

4. Monitoring system

A complete monitoring system is included in the project activity. The monitoring instruments installed include flow meters, methane meters, thermocouples, pressure and temperature gauges as well as electricity meters. All the monitoring instruments meet the relevant accuracy requirements and are regularly calibrated in accordance with the national standards or the manufacturers' specification.

5. Implementation of the project activity

The implementation of the project activity has been divided into two phases. The first phase (with three 1.7 MW gensets) started operation in May 2008. The second phase (with four additional 1.7MW gensets and a gas pre-treatment unit) started gas load commissioning in November 2010. Engines no.4, no.6 and no.7 have been operational since December 2010. Engine no.5 started commissioning on 23th of May 2011 and achieved continuous operation by 13th of June 2011. The total combined capacity of the plant is 11.9 MW. The waste heat from the installed generators will be recovered for heating the shaft air intake at the coal mine during the winter/heating season. During this monitoring period, no material changes occurred on Phases 1 and 2 of the project. An overview of special events is presented in Annex 4.

B.2. Post-registration changes

B.2.1. Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline

There have been no temporary deviations from registered monitoring plan or applied methodology in this monitoring period.

B.2.2. Corrections

There have been no corrections to project information or parameters fixed at validation have been approved during in this monitoring period or submitted with this monitoring report.

Corrections and a revised PDD (Version 4.10, completed 15/11/2012) were approved on 19 Mar 2013 prior to the submission of this monitoring report for request for issuance, with a reference number of PRC-1900-001.

B.2.3. Changes to start date of crediting period

No changes to the start date of the crediting period have been submitted or approved.

B.2.4. Inclusion of a monitoring plan to the registered PDD that was not included at registration

Not applicable

B.2.5. Permanent changes from registered monitoring plan, applied methodology or applied standardized baseline

There have been no permanent changes from the registered monitoring plan or applied methodologies have been approved during this monitoring period or submitted with this monitoring report.

Minor revisions to the initial monitoring plan included in the registered PDD were made and validated by TUV-Sued (validation report nr. 600500291). The revision was approved by the UNFCCC EB on 13/12/2009. This monitoring report has been completed by using the revised monitoring plan.

B.2.6. Changes to project design of registered project activity

No changes to project design have been applied.

B.2.7. Types of changes specific to afforestation or reforestation project activity

Not applicable to the project activity

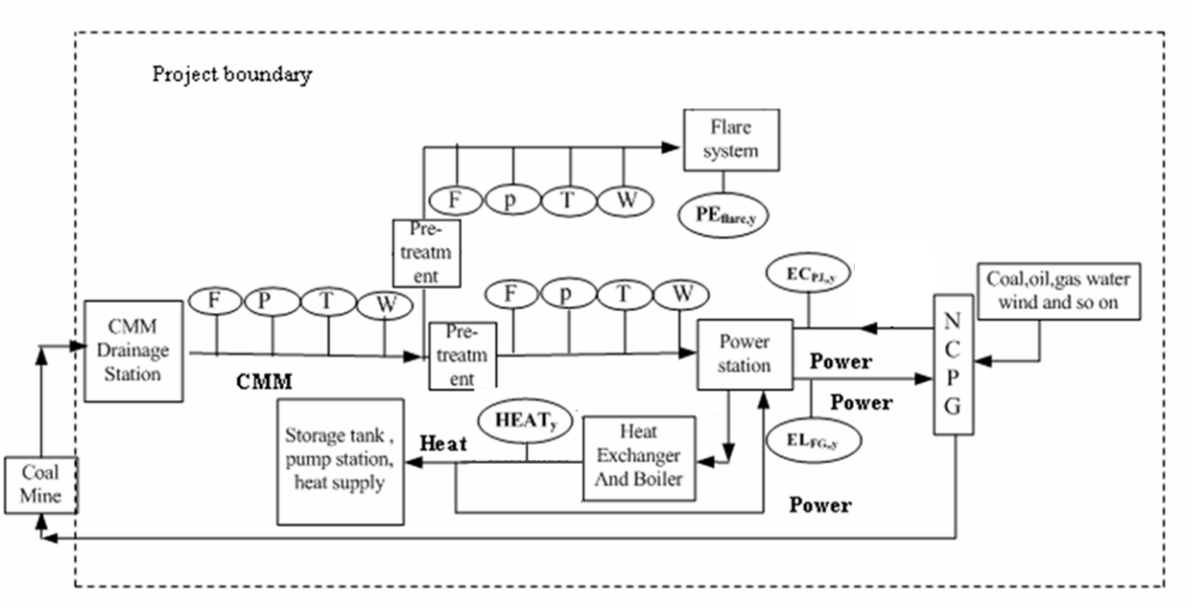
SECTION C. Description of monitoring system

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 the DOE) is based upon the requirements set out in the PDD and the revised monitoring plan 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. Net power values are recorded by Duerping mine operators every day and handed to SCC CDM engineers on monthly basis. The monitoring instrument data is logged 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.

- Analysis of CH_4 mass flow against Gross power is performed every month to confirm the back-calculating CH_4 mass flow equations are consistent month to month.

Figure C-1 is the line diagrams showing all relevant monitoring points as per registered PDD. Detailed monitoring diagrams for Phase I and Phase II of the project are included in Annex 6



F = Gas flow meter
P = Gas pressure
T = Gas temperature
W = Methane concentration

$EC_{PJ,y}$ = Electricity consumed
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Figure C-1 Schematic line diagram showing relevant monitoring point

Figure C-2 is the organizational structure of the CDM team.

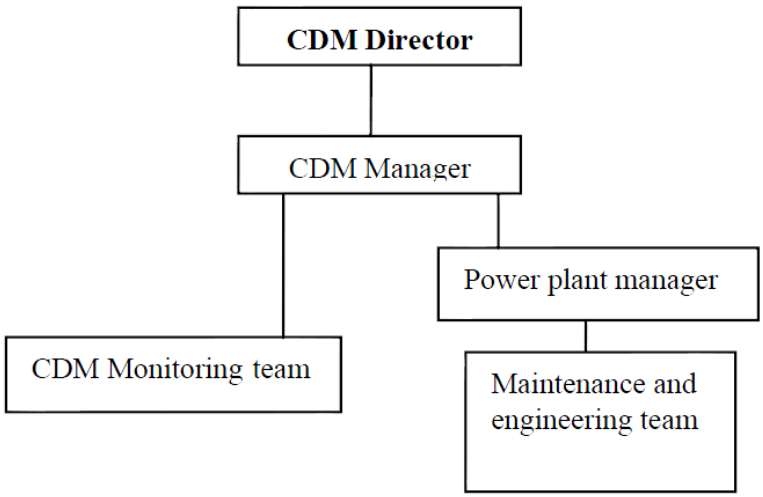

Figure C-2 Organizational structure

An overview of the data collection process is provided in Table C-1.

Table C-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 emissions	In accordance with ACM0008 version 3 no leakage is considered for the project activity			
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
Emission 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 month's records. 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 are calibrated annually (in the case of V-cones every two years) by *Institute of Metrological Supervision and Measurement of Hebei Province* (flare, oil heating circuit and engine v-cones) and by *Shanxi Provincial institute of Metrology* (the rest of CDM instruments). A list of all CDM instruments, their accuracy levels and calibration certificate numbers are presented in Annex 2. Annex 3 presents all CDM instruments installation and removal dates during the period relevant to monitoring report.

A record is available showing the location and unique identification number of each meter, the calibration status of that meter (date of last calibration and date of next calibration). All CDM instruments have integrated a Serial Number which is used to track the calibration records and installation certificates.

All calibration records are retained 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 gross power readings.

In case errors are identified, both corrective and preventive actions are taken. Annex 5 includes a list of each period during which no CDM data was recorded (all data missing). Missing of all CDM data records were due to connectivity failure between the Master or Local System Control and Data Acquisition (SCADA) systems and the central computer, preventing the measured CDM value to be recorded in the CDM database system. Periods during which all CDM data was missing had no ER claim associated.

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 in August 2013 and August 2014. A copy of the internal audit reports is available for verification by the DOE. Furthermore, a management review is carried out on a yearly basis to assess the operational/verification status, scheduling of audits and verifications, health and safety, improvements to be made and training updates and staffing.

Internal Training

Relevant process operators and CDM technical staff have received in-house Advance Training Course on 25th April 2013 and 16th July 2014 to ensure compliance with the tasks and procedures set out in the monitoring plan. Training records are available for verification by the DOE.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante or at renewal of crediting period

Data/parameter:	Eff_{ELEC}
Unit	%
Description	Efficiency of methane destruction / oxidation in power plant
Source of data	Default value taken from ACM0008 version 03
Value(s) applied	99.5
Choice of data or measurement methods and procedures	Not applicable
Purpose of data	The data is used for project emissions calculation
Additional comments	No additional comment

Data/parameter:	Eff_{heat}
Unit	%
Description	Efficiency of heat conversion in the baseline scenario
Source of data	Default value taken from ACM0008 version 3.0
Value(s) applied	100
Choice of data or measurement methods and procedures	Not applicable
Purpose of data	The data is used for baseline emissions calculation
Additional comments	No additional comment

Data/parameter:	GWP_{CH4}
Unit	tCO_2e/tCH_4
Description	Global warming potential of methane
Source of data	IPCC and change from GWP of 21 to 25 according to decision 4/CMP7 paragraph 66, EB69
Value(s) applied	25
Choice of data or measurement methods and procedures	Not applicable
Purpose of data	This data is used for baseline and project emissions calculation
Additional comments	No additional comment

Data/parameter:	CEF_{CH4}
Unit	tCO_2e/tCH_4
Description	Carbon emission factor for combusted methane
Source of data	2006 Revised IPCC Guidelines
Value(s) applied	2.75
Choice of data or measurement methods and procedures	Not applicable
Purpose of data	The data is used for project emissions calculation
Additional comments	No additional comment

Data/parameter:	Manufacturer's specification for the flare
Unit	-
Description	The flare operation in normal conditions defined by the flare manufacturer specifications provided by Nanjing Shunfen-Pioneer (flow rate 300-5,000m^3/h and flame temp from 500 – 1,350 ℃)
Source of data	Commissioning reports, certificates and approval notices provided by manufacturers or suppliers
Value(s) applied	-
Choice of data or measurement methods and procedures	Not applicable
Purpose of data	This data is not directly used but just as a reference for project emission calculations
Additional comments	Implementation of maintenance and calibrations schedules, with results (e.g. calibration certificates) to be stored for the longer of two years longer than the crediting period or two years after the last issuance of CERs.

D.2. Data and parameters monitored

Data/parameter:	MM_{ELEC}
Unit	tCH_4
Description	Methane sent to power plant
Measured/calculated/default	Measured/Calculated
Source of data	Measured by a flow meter on the inlet to each generator and a methanometer on the manifold pipe to the generators and summed. For the ex ante prediction on conversion for NTP (given by the methodology as 0.67 kg/m^3 at 20℃ and 1 atm)is required, but for ex post, temperature and pressure will be recorded and the volume adjusted to NTP using the gas law P1V1/T1=P2V2/T2.
Value(s) of monitored parameter	Refer to ER spreadsheet
Monitoring equipment	Pressure, temperature, CH4 concentration and flow meters with differential pressure measurement function are used to determine the amount of methane sent to generators, see Annex 2 for details
Measuring/reading/recording frequency:	Measurements are taken continuously and logged at nominal 30 second intervals
Calculation method (if applicable):	The V-cone records gas volumes and the pressure gauge and temperature meter record the gas pressure and temperature. Methane concentration meter records the volumetric CH_4 concentration.
QA/QC procedures:	Calculations are performed by spreadsheet, which are audited periodically and protected from being over-written or altered by unauthorized personnel. Data is backed up and archived in two different locations, where it will be stored for the longer of two years longer than the crediting period or two years after the last issuance of CERs. The volume of methane destroyed is correlated with gross power output from the generators.
Purpose of data:	This data is used for baseline and project emissions calculation
Additional comments:	No additional comment

Data/parameter:	PEy
Unit	tCO_2e
Description	Project emissions in period y
Measured/calculated/default	Calculated
Source of data	Calculated from sum of emissions from combustion of methane and emissions of un-combusted methane.
Value(s) of monitored parameter	Refer to ER spreadsheet
Monitoring equipment	Pressure, temperature, CH4 concentration and flow meters with differential pressure measurement function are used to determine the amounts of methane combusted and un-combusted by the project activity. See Annex 2 for details
Measuring/reading/recording frequency:	Measurements are taken continuously and logged at nominal 30-second intervals.
Calculation method (if applicable):	
QA/QC procedures:	Calculations are performed by spreadsheet, which are audited periodically and protected from being over-written or altered by unauthorized personnel. Data is backed up and archived in two different locations, where it will be stored for the longer of two years longer than the crediting period or two years after the last issuance of CERs. The volume of methane destroyed is correlated with gross power output from the generators.
Purpose of data:	This is project emission.
Additional comments:	No additional comment

Data/parameter:	PEmd
Unit	tCO_2e
Description	Project emissions from destruction of methane
Measured/calculated/default	Calculated
Source of data	Calculated from volume of methane at normal temperature and pressure combusted by generators and flares multiplied by 2.75. Ex ante volume of methane consumed is in Nm^3, therefore no conversion is necessary before applying the density. For the ex ante prediction no conversion for NTP is required, but ex post, temperature and pressure will be recorded and the volume adjusted to NTP using the gas law P1V1/T1=P2V2/T2
Value(s) of monitored parameter	Refer to ER spreadsheet
Monitoring equipment	Pressure, temperature, CH4 concentration and flow meters with differential pressure measurement function are used to determine the project emissions from destruction of methane by the project activity, as per Annex 2 for full details
Measuring/reading/recording frequency:	Measurements are taken continuously and logged at nominal 30 second intervals
Calculation method (if applicable):	Volume of pure methane destroyed is calculated from volume and concentration measurements taken every 30 seconds at the inlet to the generators and flare. See MD_{ELEC} and MD_{FL} below

QA/QC procedures:	Calculations are performed by spreadsheet, which are audited periodically and protected from being over-written or altered by unauthorized personnel. Data is backed up and archived in two different locations, where it will be stored for the longer of two years longer than the crediting period or two years after the last issuance of CERs. The volume of methane destroyed is correlated with gross power output from the generators.
Purpose of data:	This is part of project emission.
Additional comments:	No additional comment

Data/parameter:	**PEum**
Unit	tCO_2e
Description	Un-combusted methane emitted from the generators, flare
Measured/calculated/default	Calculated
Source of data	Calculated from mass of methane burnt in generators, flare
Value(s) of monitored parameter	Refer to ER spreadsheet
Monitoring equipment	Pressure, temperature, CH4 concentration and flow meters with differential pressure measurement function are used to determine PEmd, the amount of methane combusted by engines and flare. See Annex 2 for details. Default efficiency is 99.5%, therefore un-combusted methane from generators is: (0.005 * methane sent to generator sets and the flare). Default efficiency for flares is 90%, therefore un-combusted methane from flare is (0.1* methane sent to generator sets and the flare)
Measuring/reading/recording frequency:	Measurements are taken continuously and logged at nominal 30 second intervals
Calculation method (if applicable):	
QA/QC procedures:	Calculations are performed by spreadsheet, which are audited periodically and protected from being over-written or altered by unauthorized personnel. Data is backed up and archived in two different locations, where it will be stored for the longer of two years longer than the crediting period or two years after the last issuance of CERs. The volume of methane destroyed is correlated with gross power output from the generators
Purpose of data:	This is part of project emission.
Additional comments:	No additional comment

Data/parameter:	**MD_{ELEC}**
Unit	tCH_4
Description	Methane destroyed by power generators
Measured/calculated/default	Measured/Calculated
Source of data	Calculated from the flow and concentration of methane at the inlet to the generators and methane concentration at the manifold to the generators
Value(s) of monitored parameter	See MM_{ELEC} and PC_{CH4} . As per Annex 2 for details
Monitoring equipment	See MM_{ELEC} and PC_{CH4}. As per Annex 2 for details
Measuring/reading/recording frequency:	Measurements are taken continuously and logged at nominal 30 second intervals
Calculation method (if applicable):	It is calculated from MM_{ELEC} and PC_{CH4}

QA/QC procedures:	Calculations are performed by spreadsheet, which are audited periodically and protected from being over-written or altered by unauthorized personnel. Data is backed up and archived in two different locations, where it will be stored for the longer of two years longer than the crediting period or two years after the last issuance of CERs. The volume of methane destroyed is correlated with gross power output from the generators.
Purpose of data:	This data is used for project emission calculations
Additional comments:	No additional comment

Data/parameter:	**MM_{FL}**
Unit	tCH_4
Description	Methane sent to flare(s)
Measured/calculated/default	Measured/Calculated
Source of data	Measured continuously using flow meters and CH4 levels on the inlet to the flares. Flow, temperature and absolute pressure will be recorded and the volume normalized as per Flaring tool.
Value(s) of monitored parameter	As per ER spreadsheet
Monitoring equipment	V-cone with differential pressure flow meters as per Annex 2 for details
Measuring/reading/recording frequency:	Continuously, recorded every 30 seconds
Calculation method (if applicable):	Pressure, temperature, CH4 concentration and flow meters with differential pressure measurement function are used to determine the amount of methane sent to the flares. Mass of methane sent to the flares is determined taking into account the density of methane under normal conditions of temperature and pressure. Density of methane under normal conditions of temperature and pressure is 0.67 kg/m^3 (revised 1996 IPCC Reference manual p.1.24 and 1.16).
QA/QC procedures:	Refer to MM_{ELEC}
Purpose of data:	This data is used for baseline and project emissions calculation
Additional comments:	No additional comment

Data/parameter:	**MD_{FL}**
Unit	tCH_4
Description	Methane sent to flare(s)
Measured/calculated/default	Measured/Calculated
Source of data	Calculated from MMFL and $\eta_{flare,h}$
Value(s) of monitored parameter	As per ER spreadsheet
Monitoring equipment	As per MM_{FL} and $\eta_{flare,h}$
Measuring/reading/recording frequency:	N/A
Calculation method (if applicable):	See MM_{FL} and $\eta_{flare,h}$
QA/QC procedures:	Calculations are performed by spreadsheet (at least monthly) which are audited periodically and protected from being over-written or altered by unauthorized personnel. Data is backed up and archived in two different locations, where it will be stored for a period of two years after the crediting period or two years after the last issuance of CERs.
Purpose of data:	This data is used for project emissions calculation
Additional comments:	No additional comment

Data/parameter:	GEN_y
Unit	MWh
Description	Electricity generated by the project
Measured/calculated/default	Measured
Source of data	Net power is calculated from the difference between gross power from all the generators (positive active power) and the power consumption by the project (negative active power).
Value(s) of monitored parameter	As per ER spreadsheet
Monitoring equipment	6.3kV and 35kV Power meters as per Annex 2 for further details.
Measuring/reading/recording frequency:	Continuously measured but manually recorded everyday by a site operator.
Calculation method (if applicable):	Positive active power (gross power) and negative active power (power consumed by the project) are both measured continuously with a single power meter located at the link from the generators to the power grid. Net power is calculated from the difference of these two readings.
QA/QC procedures:	Calculations are performed by spreadsheet, which are audited periodically and protected from being over-written or altered by unauthorized personnel. Data is backed up and archived in two different locations, where it will be stored for the longer of two years longer than the crediting period or two years after the last issuance of CERs. The net export meter power meter has been approved by the local power company and calibrated and monitored in accordance with their instructions.
Purpose of data:	This data is used for baseline emissions calculation
Additional comments:	No additional comment

Data/parameter:	$HEAT_y$
Unit	GJ
Description	Heat generation by project
Measured/calculated/default	Measured/Calculated
Source of data	Measurement of flow rate on the oil heating circuit and the oil temperatures on the outward and returning heating Pipes
Value(s) of monitored parameter	As per ER spreadsheet
Monitoring equipment	V-cone flow meter and Temperature meter As per Annex 2 for details
Measuring/reading/recording frequency:	Continuously, recorded every 30 seconds
Calculation method (if applicable):	During heating season waste heat is transferred from the generators to the mines ventilation, heater and building by way of closed circuit heat transfer system. The circuits are fitted with constant flow pumps, thermocouples in the flow and return pipes and flow meter. Actual heat transferred is determined by measuring the flow, inlet and return temperatures and logging the data.
QA/QC procedures:	Temperature and flow rate data is used to calculate heat supplied and this is fed into a data logger for determination of heat supply. Heat will be supplied to meet demand (in winter months) which is determined by need for compliance with mine air temperature regulations and hence on ambient temperature which will also be recorded. Measurement equipment is calibrated and monitored in accordance with manufacturer instructions.
Purpose of data:	This data is used for baseline emissions calculation
Additional comments:	No additional comment

Data/parameter:	PC_{CH4}
Unit	%
Description	Percentage of pure methane (wet basis) in drained gas (by volume)
Measured/calculated/default	Measured
Source of data	Methanometer at the manifold to the generator
Value(s) of monitored parameter	As per ER spreadsheet
Monitoring equipment	Methane concentration is measured by proprietary infrared instrumentation mounted in the gas pipe work at the gas treatment units. Accuracy of analysis +/-2.5%FSD. Gas analyzed as sample (gas dried by pretreatment). Measurements are taken continuously and logged at nominal 30-second intervals. Annex 2 for details
Measuring/reading/recording frequency:	Continuously, recorded every 30 seconds
Calculation method (if applicable):	Not applicable
QA/QC procedures:	Calculations are performed by spreadsheet, which are audited periodically and protected from being over-written or altered by unauthorized personnel. Data is backed up and archived in two different locations, where it will be stored for the longer of two years longer than the crediting period or two years after the last issuance of CERs.
Purpose of data:	This data is used for both baseline and project emissions calculation
Additional comments:	No additional comment

Data/parameter:	PC_{NMHC}
Unit	%
Description	Percentage of non-methane hydrocarbons in CMM, by mass coal mine gas
Measured/calculated/default	Measured
Source of data	Tube sample analysis
Value(s) of monitored parameter	Not applicable at this stage because the sum of all non-methane hydrocarbons in gas samples is less than 1% and therefore can be ignored. Gas laboratory sample results available during verification.
Monitoring equipment	N/A
Measuring/reading/recording frequency:	Annually, samples of gas were extracted into gas sampling bottles using the appropriate procedures and analyzed by qualified laboratory such as Beijing Huayuan Gas Chemical Industry in China or TES Bretby in the UK
Calculation method (if applicable):	N/A
QA/QC procedures:	A minimum of 3 samples is collected in secure gas sample vessels, suitable for storage and transport to the selected laboratory. Samples are taken in accordance with protocol procedures in the CDM monitoring manual and analyzed in a qualified laboratory. If one or more samples are found to be faulty (i.e. leaked) replacement samples will be taken. Scanned copies of the analyses are backed up and archived in two different locations, where they will be stored for the longer of two years longer than the crediting period or two years after the last issuance of CERs.
Purpose of data:	This data is used for project emissions calculation
Additional comments:	No additional comment

Data/parameter:	CEF_{NMHC}
Unit	$tCO_2e/tNMHC$

Description	Carbon emission factor for combusted non-methane hydrocarbons
Measured/calculated/default	Calculated
Source of data	If necessary, the value for specific non-methane hydrocarbons will be determined by stoichiometric calculation.
Value(s) of monitored parameter	Not applicable at this stage because the sum of all non-methane hydrocarbons in gas samples is less than 1% and therefore can be ignored. Gas laboratory sample results available during verification.
Monitoring equipment	N/A
Measuring/reading/recording frequency:	N/A
Calculation method (if applicable):	Derived using measurements described in PC_{NMHC}
QA/QC procedures:	N/A
Purpose of data:	This data is used for project emissions calculation
Additional comments:	No additional comment

Data/parameter:	**R**
Unit	%
Description	Relative proportion of NMHC compared to methane
Measured/calculated/default	Calculated
Source of data	Calculated from PC_{NMHC}/ PC_{CH4}
Value(s) of monitored parameter	Determined from annual tests of samples of coalmine methane. Not applicable at this stage because the sum of all non-methane hydrocarbons in gas samples is less than 1%, as per tube samples SCC WS1, SCC 7 and SCC 16 taken on 04 June 2014 and analyzed on 12 June 2014 by Beijing Huayan Gas Chemical Industry Co. Ltd. Gas laboratory sample results available during verification.
Monitoring equipment	N/A
Measuring/reading/recording frequency:	Annually, samples of gas were extracted into gas sampling bottles using the appropriate procedures and analyzed by qualified laboratories such as Beijing Huayuan Gas Chemical Industry in China or TES Bretby in the UK
Calculation method (if applicable):	N/A
QA/QC procedures:	If applicable, this figure will be built into a spreadsheet for calculating emissions. Not applicable – sum of all non-methane hydrocarbons in any of the tube samples was found less than 1%. Gas laboratory sample results available during verification.
Purpose of data:	This data is used for project emissions calculation
Additional comments:	No additional comment

Data/parameter:	**$FV_{RG,h}$**
Unit	m^3/h
Description	volumetric flow rate of the residual gas at normal conditions in the hour h (residual gas to flare)
Measured/calculated/default	Measured
Source of data	Measured using a flow meter.
Value(s) of monitored parameter	As per ER spreadsheet

Monitoring equipment	Flow meter instrument as per Annex 2
Measuring/reading/recording frequency:	Measurements are taken continuously and logged at nominal 30-second intervals.
Calculation method (if applicable):	N/A
QA/QC procedures:	Flow meters are periodically calibrated according to the manufacturer's recommendation. Ensure that the same basis is considered for this measurement and the measurement of the volumetric fraction of all components in the residual gas when the residual gas temperature exceeds 60 °C.
Purpose of data:	This data is used for both baseline and project emissions calculation
Additional comments:	No additional comment

Data/parameter:	$fv_{CH4,RG,h}$
Unit	%
Description	volumetric fraction of methane in the residual gas on dry basis in the hour h
Measured/calculated/default	Measured
Source of data	Measured by project participants using a continuous gas analyzer
Value(s) of monitored parameter	As per ER spreadsheet
Monitoring equipment	Gas monitoring instrument as per Annex 2
Measuring/reading/recording frequency:	Ensure that the same basis is considered for this measurement and the measurement of the volumetric fraction of all components in the residual gas when the residual gas temperature exceeds 60 °C.
Calculation method (if applicable):	N/A
QA/QC procedures:	Analyzers are periodically calibrated according to the manufacturer's recommendation. A zero check and a typical value check is performed by comparison with a standard certified gas.
Purpose of data:	This data is used for both baseline and project emissions calculation
Additional comments:	No additional comment

Data/parameter:	T_{flare}
Unit	^{o}C
Description	Temperature of the flue gas of the flare
Measured/calculated/default	Measured
Source of data	Flare thermocouple(s)
Value(s) of monitored parameter	As per ER spreadsheet
Monitoring equipment	Flare thermocouple(s) type N as per Annex 2 for details
Measuring/reading/recording frequency:	Continuously, recorded every 30 seconds. Monitored continuously by a Type N thermocouple. A temperature above 500 degrees Celsius indicates that a significant amount of gases are being burnt and that the flare is operating.
Calculation method (if applicable):	N/A
QA/QC procedures:	Data is backed up and archived where it will be stored for the longer of two years longer than the crediting period or two years after the last issuance of CERs. Thermocouples are calibrated according to the manufacturer's specifications.

Purpose of data:	This data is not directly used for project emissions calculation but used for the determination of the flare efficiency.
Additional comments:	No additional comment

Data/parameter:	$\eta_{flare,h}$
Unit	%
Description	Flare efficiency in hour *h*
Measured/calculated/default	Calculated
Source of data	Flare thermocouple(s)
Value(s) of monitored parameter	0, if the temperature in the exhaust gas of the flare (T_{flare}) is below 500 °C for more than 20 minutes during the hour h. 50%, if the temperature in the exhaust gas of the flare (T_{flare}) 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 (T_{flare}) 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.
Monitoring equipment	Flare thermocouple(s) type N as per Annex 2 for details
Measuring/reading/recording frequency:	Measurements are taken continuously and logged at nominal 30 second intervals.
Calculation method (if applicable):	$\eta_{flare,h}$ cannot be directly monitored. Therefore, the parameter T_{flare} is instead monitored in order to measure the flare combustion efficiency (refer to the "Tool to determine project emissions from flaring gases containing methane").
QA/QC procedures:	Data is backed up and archived in two different locations, where it will be stored for a period of two years after the crediting period or two years after the last issuance of CERs.
Purpose of data:	This data is used for project emissions calculation
Additional comments:	No additional comment

Data/parameter:	T
Unit	Kelvin
Description	Temperature of CMM
Measured/calculated/default	Measured
Source of data	Temperature sensor on gas pipework between the treatment unit and the generators
Value(s) of monitored parameter	As per ER spreadsheet
Monitoring equipment	PT 100 temperature transmitter as per Annex 2 for details
Measuring/reading/recording frequency:	Measurements are taken continuously and logged at nominal 30 second intervals.
Calculation method (if applicable):	N/A
QA/QC procedures:	Data is backed up and archived in two different locations, where it will be stored for a period of two years after the crediting period or two years after the last issuance of CERs.
Purpose of data:	This data is used for baseline emissions calculation
Additional comments:	No additional comment

D.3. Implementation of sampling plan

Not applicable to the project activity.

SECTION E. Calculation of emission reductions or GHG removals by sinks

E.1. Calculation of baseline emissions or baseline net GHG removals by sinks

The formulae used for determination of the baseline emissions are described in section B.6.1 of the registered PDD for the project activity. It is available on the UNFCCC website.
http://cdm.unfccc.int/UserManagement/FileStorage/Q3PBR459OM8KI0Y6FATGX1SJW27HNC

Baseline emissions are calculated as follows:

$BE_y = BE_{MD,y} + BE_{MR,y} + BE_{Use,y}$ **(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 destruction of methane in the baseline scenario in year y

No methane is destroyed in the baseline scenario therefore $BE_{MD,y}$ are zero.

$BE_{MR,y}$ Baseline emissions from release of methane into the atmosphere in year y that is avoided by the project activity

The original formula used for $BE_{MR,y}$ calculation in ACM0008/version 03 is as the following:

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

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 (25 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. In line guidance given in the EB 55 report[1], as the gas is extracted from the mine within the project boundary of the CDM project activity, and a connection between $CMM_{PJ,i,y}$ (pre-mining CMM captured, sent and destroyed) and $PMM_{PJ,i,y}$ (post-mining CMM captured, sent to and destroyed) is in the underground mine as specified in ACM0008 version 7, the practice of combined measurement and baseline emissions are determined ex post by measuring the methane emitted from the methane drainage system at the point where it enters the equipment.

The release of methane into the atmosphere is avoided by the project activity through power generation and destruction in the enclosed flare. Therefore formula (2) can be simplified to:

$$BE_{MR,y} = GWP_{CH4} \times (MM_{ELEC} + MM_{FL}) \quad \textbf{(3)}$$

Where:

MM_{ELEC} Methane measured sent to power plant (tCH_4)

MM_{FL} Methane measured sent to the flare (tCH_4)

$BE_{Use,y}$ Baseline emissions from the production of power, heat or supply to gas grid replaced by the project activity in year y

Electricity and heat will be generated by the project activity, therefore baseline emissions from the production of power and heat replaced by the project activity in year y (tCO_2e) is:

$$BE_{use,y} = GEN_y \times EF_{ELEC} + HEAT_y \times EF_{HEAT} \quad \textbf{(4)}$$

Where:

GEN_y Electricity generated by project activity in year y (MWh)

EF_{ELEC} Emissions factor of gird electricity replaced by the project activity (tCO_2/MWh)

$HEAT_y$ Heat generation by project activity in year y (GJ)

EF_{HEAT} Emissions factor for heat production replaced by project activity (tCO_2/GJ)

The EF_{ELEC} is calculated as per ACM0002 version 6, from the average of the operating margin and build margin in the North China Power Grid.

EF_{OM}	1.1208
EF_{BM}	0.9397

According ACM0002, the baseline grid emission factor is the simple average of BM and OM:
1.1208 + 0.9397/ 2 = 1.03025 tCO_2/MWh

[1] http://cdm.unfccc.int/UserManagement/FileStorage/JTV1YA8FCHR4W2GMEOQ53SK60P9DLX

The emissions factor for displaced heat generation is calculated as follows:

$$EF_{heat,y} = \frac{EF_{CO2,i}}{Eff_{heat}} \times \frac{44}{12} \times \frac{1TJ}{1000GJ} \quad \textbf{(5)}$$

Where:

$EF_{heat,y}$	Emissions factor for heat generation (tCO_2/GJ)
$EF_{CO2,i}$	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%.

Here below is the sample calculation for BE_y during the period 01/01/2013 – 31/01/2013.

Sample calculation for $BE_{MR,y}$ during the period 01/01/2015 – 31/01/2015:

Symbol	Value	Units
ρ (CH_4) at 101.325Pa and 273 K	0.000716	t/m^3
GWP_{CH4}	25	tCO_2e/tCH_4
CEF_{CH4}	2.75	tCO_2e/tCH_4
$V_{CMM,ELEC}$	4,576,251	m^3
$PC_{CH4,ELEC}$	39.1	%
$V_{CMM,FL}$	1,345	m^3
$PC_{CH4,FL}$	40.1	%
$MM_{ELEC} = V_{CMM,ELEC} \times PC_{CH4,ELEC} \times \rho_{CH4}$	1,281	tCH_4
$MM_{FL} = V_{CMM,FL} \times PC_{CH4,FL} \times \rho_{CH4}$	0.4	tCH_4
$BE_{MR} = GWP_{CH4} \times (MM_{ELEC} + MM_{FL})$	32,032	tCO_2e

Where :

$V_{CMM,ELEC}$ = cumulative volume of CMM measured sent to the power engines during the period 01/01/2015 – 31/01/2015 (m^3)

$V_{CMM,FL}$ = cumulative volume of CMM measured sent to the flare during the period 01/01/2015 – 31/01/2015 (m^3)

$PC_{CH4,ELEC}$ = Concentration of methane of CMM measured sent to the power engines during the period 01/01/2015 – 31/01/2015 (%)

$PC_{CH4,FL}$ = Concentration of methane of CMM measured sent to the flares during the period 01/01/2015 – 31/01/2015 (%)

Sample calculation for $BE_{Use,y}$ during the period 01/01/2015 – 31/01/2015:

Symbol	Value	Units
EF_{ELEC}	1.03025	tCO_2/MWh
EF_{HEAT}	0.0946	tCO_2/GJ
GEN_y	6,559	MWh
$HEAT_y$	4,181	GJ
$BE_{Use,y} = GEN_y \times EF_{ELEC} + HEAT_y \times EF_{HEAT}$	7,151	tCO_2e

So that $BE_y = BE_{MD,y} + BE_{MR,y} + BE_{Use,y} = 0 + 32,032 + 7,151 = 39,182\ tCO_2e$.

The baseline emissions are calculated in the ER calculation excel spreadsheets, and a summary of the results are provided in section E.4.

E.2. Calculation of project emissions or actual net GHG removals by sinks

The formulae used for determination of the project emissions are described in section B.6.1 of the registered PDD for the project activity. It is available on the UNFCCC website.
http://cdm.unfccc.int/UserManagement/FileStorage/Q3PBR459OM8KI0Y6FATGX1SJW27HNC

Project emissions are calculated as follows:

$PE_y = PE_{ME} + PE_{MD} + PE_{UM}$ **(6)**

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} Project emissions from energy use to capture and use methane

The project activity will consume some electricity during operation. No additional heat or fossil fuel will be consumed Therefore:

$$PE_{ME} = CONS_{ELEC,PJ} \times EF_{ELEC} \quad \textbf{(7)}$$

But in practice only the readings of the net electricity output (GEN_y-$CONS_{ELEC,PJ}$) is recorded
So:

$$BE_{use,y} - PE_{ME} = GEN_y \times EF_{ELEC} + HEAT_y \times EF_{HEAT} - CONS_{ELEC,PJ} \times EF_{ELEC}$$
$$= (GEN_y - CONS_{ELEC,PJ}) \times EF_{ELEC} + HEAT_y \times EF_{HEAT}$$

Hence in the emission reduction calculations, the PE_{ME} can be treated as zero.

PE_{MD} Project emissions from methane destroyed

Only gensets and flare is installed for the project activity, CMM is not used directly in CMM boilers or distributed into the gas pipelines. Therefore:

$$PE_{MD} = (MD_{FL} + MD_{ELEC}) \times (CEF_{CH4} + r \times CEF_{NMHC}) \quad \textbf{(8)}$$

with:

$$r = PC_{NMHC} / PC_{CH4} \quad \textbf{(9)}$$

Where:[2]

PE_{MD}	Project emissions from CMM destroyed (tCO_2e)
MD_{FL}	Methane destroyed through flaring (tCH_4)
MD_{ELEC}	Methane destroyed through power generation (tCH_4)

[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_{CH4}	Carbon emission factor for combusted methane (2.75 tCO_2e/tCH_4)
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_2e/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 (%)

As the volumetric fraction of NMHC measured in the external lab is lower than 1% in this monitoring period, it can be ignored. Hence formula can be simplified as:

$$PE_{MD} = CEF_{CH4} \times (MD_{FL} + MD_{ELEC}) \quad \textbf{(10)}$$

Not all of the methane sent to power plant and flare will be combusted, so a small amount will escape to the atmosphere. The combusted methane is calculated using the following formulas:

$$MD_{ELEC}=MM_{ELEC} \times Eff_{ELEC} \quad \textbf{(11)}$$

Where:

MD_{ELEC}	Methane destroyed through power generation (tCH_4)
MM_{ELEC}	Methane measured sent to power plant (tCH_4)
Eff_{ELEC}	Efficiency of methane destruction/oxidation in power plant (taken as 99.5% from IPCC)

$$MD_{FL} = MM_{FL} - PE_{flare}/GWP_{CH4} \quad \textbf{(12)}$$

Where:

MD_{FL}	Methane destroyed through flaring (tCH_4)
MM_{FL}	Methane measured sent to flare (tCH_4)
PE_{flare}	Project emissions of non-combusted CH_4, expressed in terms of CO_2e, from flaring of the residual gas stream (tCO_2e), calculated according to the "*Tool to determine project emissions from flaring gases containing Methane*"
GWP_{CH4}	Global warming potential of methane ($25tCO_2e/tCH_4$)

The project emissions from flaring of the residual gas stream (PE_{flare}) shall be calculated following the procedures described in the "Tool to determine project emissions from flaring gases containing Methane".

Project emissions from flaring ($PE_{flare,y}$)are calculated as the sum of emissions from each hour *h*, based on the methane flow rate in the residual gas ($TM_{RG,h}$) and the flare efficiency during each hour *h* ($\eta_{flare,h}$), as follows:

$$PE_{flare,y}= \sum_{h=1}^{8760} TM_{RG,h} \times (1-\eta_{flare,h}) \times GWP_{CH4} / 1000 \quad \textbf{(13)}$$

Where:

$TM_{RG,h}$	Mass flow rate of methane in the residual gas in the hour h($kgCH_4/h$)
$\eta_{flare,h}$	Flare efficiency in hour h(%)
GWP_{CH4}	Global warming potential of methane valid for the first commitment period ($25tCO_2e/tCH_4$).

The calculation for $TM_{RG,h}$ is shown below:

$$TM_{RG,h}=FV_{RG,h} \times \omega_{CH4,y} \times D_{CH4} \quad \textbf{(14)}$$

Where:

$FV_{RG,h}$	Volumetric flow rate of the residual gas in dry basis at normal conditions in hour h(m^3/h)
$\omega_{CH4,y}$	*(also PC_{CH4})* Volumetric fraction of methane in the residual gas on dry basis in hour h(%)
D_{CH4}	Methane density (tCH_4/m^3CH_4), density of methane under normal conditions of temperature and pressure (20°C and 1atm) is 0.67kg/m^3 (Revised 1996 IPCC Reference Manual p 1.24 and 1.16)

For the enclosed flares, option a) of the flare tool - a default value is used to determine the flare efficiency. Continuous monitoring of compliance with manufacturer's specifications of flare (temperature, flow rate) is performed , the following efficiencies will be used under different situations:

- 0% if the temperature in the exhaust gas of the flare (T_{flare}) is below 500 ℃ for more than 20 minutes during the hour *h.*
- 50%, if the temperature in the exhaust gas of the flare (T_{flare}) is above 500 ℃ 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 (T_{flare}) is above 500 ℃ 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*.

PE_{UM} Project emissions from un-combusted methane

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

$$PE_{UM} = GWP_{CH4} \times MM_{ELEC} \times (1 - Eff_{ELEC}) + PE_{flare} \quad \textbf{(15)}$$

Where:

PE_{UM}	Project emissions from un-combusted methane (tCO_2e)
GWP_{CH4}	Global warming potential of methane (25 tCO_2e/tCH_4)
MM_{ELEC}	Methane measured sent to power plant (tCH_4)
Eff_{ELEC}	Efficiency of methane destruction in power plant (%) (taken as 99.5% from IPCC)
PE_{flare}	Project emissions from flaring of the residual gas stream (tCO_2e), calculated in accordance with formulas (13) and (14)

Here below is the sample calculation for PE_y during the period 01/01/2015 – 31/01/2015.

Sample calculation for PE_{ME} during the period 01/01/2015 – 31/01/2015:

Symbol	Value	Units
EF_{ELEC}	1.03025	tCO_2/MWh
$CONS_{ELEC,PJ}$	0.6	MWh
$PE_{ME}=CONS_{ELEC,PJ} \times EF_{ELEC}$	0.62	tCO_2e

Sample calculation for PE_{MD} during the period 01/01/2015 – 31/01/2015:

Symbol	Value	Units
CEF_{CH4}	2.75	tCO_2/tCH_4
r	0 (as of PC_{NMHC}<1% by lab tests of CMM samples)	
Eff_{ELEC}	99.5	%
MM_{ELEC}	1,281	tCH_4
MM_{FL}	0	tCH_4
$MD_{ELEC}=MM_{ELEC}\times Eff_{ELEC}$	1,274	tCH_4
$MD_{FL}=\sum_h MMFL,h\times\eta_{flare,h}$	0	tCH_4
$PE_{MD}=(MD_{FL}+MD_{ELEC})\times(CEF_{CH4}+r\times CEF_{NMHC})$	3,504.8	tCO_2e

Sample calculation for PE_{UM} during the period 01/01/2015 – 31/01/2015:

Symbol	Value	Units
GWP_{CH4}	25	tCO_2e/tCH_4
Eff_{ELEC}	99.5	%
MM_{ELEC}	1,280.88	tCH_4
MM_{FL}	0.4	tCH_4
$MD_{ELEC}=MM_{ELEC}\times Eff_{ELEC}$	1,274.47	tCH_4
$MD_{FL}=\sum_h MMFL,h\times\eta_{flare,h}$	0.4	tCH_4
PE_{flare}	10.3	tCO_2e
$PE_{UM}=GWP_{CH4}\times MM_{ELEC}\times(1-Eff_{ELEC})+PE_{flare}$	169.8	tCO_2e

So that $PE_y= PE_{ME} + PE_{MD} + PE_{UM}= 0.6 + 3,504.8 + 169.8 = 3,675\ tCO_2e$

The project emissions are calculated in the ER calculation excel spreadsheets, and a summary of the results are provided in section E.4.

E.3. Calculation of leakage

There is no overlap usage between methane consumption in the baseline and the methane consumption by the project activity during the monitoring period therefore there is no leakage to consider in this category.

E.4. Summary of calculation of emission reductions or net GHG removals by sinks

Item	Baseline emissions or baseline net GHG removals by sinks (t CO_2e)	Project emissions or actual net GHG removals by sinks (t CO_2e)	Leakage (t CO_2e)	GHG emission reductions or net GHG removals by sinks (t CO_2e) achieved in the monitoring period		
				Up to 31/12/2012	From 01/01/2013	Total amount
Total	584,837	56,556	0	0	528,281	528,281

E.5. Comparison of actual emission reductions or net GHG removals by sinks with estimates in registered PDD

Item	Values estimated in ex ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (tCO_2e)	(306 days in 2013 + 151 days in 2014) / 365 x 378,478= 473,875	528,281

E.6. Remarks on difference from estimated value in registered PDD

There is a small increase in the reported emission reductions achieved during the current monitoring period from that stated in the registered CDM-PDD. The registered PDD estimates a total of 473,875 tCO_2e for the current monitoring period (calculation as per table in section E.5), while 528,281 tCO_2e have actually been generated during the same period. However this apparent increase is based on the GWP factor of 25 tCO2e/tCH4 used in the Monitoring Report (according to decision 4/CMP7 paragraph 66, EB69) versus the lower GWP of 21tCO2e/tCH4 used in the ex-ante emission reduction calculation of the registered PDD.

Appendix 1. Contact information of project participants and responsible persons/entities

Project participant and/or responsible person/ entity	☒ Project participant ☐ Person/entity responsible for completing the CDM-MR-FORM
Organization name	Sindicatum Carbon Capital Ltd
Street/P.O. Box	Sindicatum Sustainable Resources Group, 80 Anson Road, #28-02,
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State/region	
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Country	Singapore
Telephone	+65 6732 8897
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Website	http://www.sindicatum.com
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Salutation	Mr
Last name	Mariyappan
Middle name	-
First name	Jay
Department	Delivery
Mobile	-
Direct fax	-
Direct tel.	-
Personal e-mail	jmariyappan@gmail.com

Appendix 2. CDM Monitoring equipment calibration dates

No	Name	Instrument type	SN	Scale	Calibration certificate	Calibration date	Calibration validity	Accuracy class	
								Accuracy class	Reference source
1	Flare gas T	shanghai Hongda WZPK (Pt100)	070907963	0-100 □	JZRX20132148	2013-5-27	1 year	Class A (allowable deviation ±(0.15+0.002ltl))	Manufacturer Technical Specification
					JZRX201402704	2014-5-20	1 year	Class A (allowable deviation ±(0.15+0.002ltl))	Manufacturer Technical Specification
					JZRX201502859	2015-5-14	1 year	Class A (allowable deviation ±(0.15+0.002ltl))	Manufacturer Technical Specification
2	Phase 1 engine gas T	WZP-240 (PT100)	908273	-200-450 □	JZRX20132150	2013-5-27	1 year	Class A (allowable deviation ±(0.15+0.002ltl))	Manufacturer Technical Specification
		Anhui Tiankang WZP-240 (Pt100)	-	-200-450 □	JZRX201402699	2014-5-20	1 year	Class A (allowable deviation ±(0.15+0.002ltl))	Manufacturer Technical Specification
		WZP-240(PT100)	908273	-200-450 □	JZRX201502861	2015-5-14	1 year	Class A (allowable deviation ±(0.15+0.002ltl))	Manufacturer Technical Specification
3	Phase 2 engine gas T	Honeywell STT830-171-TC.M1.W1.CD-WEEO-H06S-R2U6-A05TR080-2D-000	080625368	0-100□	JZRX20132147	2013-5-27	1 year	Class A ± (0.15+0.002 ltl)	Manufacturer Technical Specification
		Zhejiang Lunte N-WZPK-270	2012031768	-200-350 □	JZRX201402698	2014-5-20	1 year	Class A ± (0.15+0.002 ltl)	Manufacturer Technical Specification
		Honeywell STT830-171-TC.M1.W1.CD-WEEO-H06S-R2U6-A05TR080-2D-000	080625368	0-100□	JZRX201502860	2015-5-14	1 year	Class A ± (0.15+0.002 ltl)	Manufacturer Technical Specification
4	Flare thermal couples	Honeywell STT830-173-TC.M3.W1.CD-WEEO-H10S-T7G6-A05T(Y)240-2D-000	080609834	0-1300 □	JZRX20132152	2013-5-27	1 year	Class I (allowable deviation ±(0.0075ltl))	Manufacturer Technical Specification
					JZRX201402498	2014-5-20	1 year	Class I (allowable deviation ±(0.0075ltl))	Manufacturer Technical Specification
					JZRX201502585	2015-5-14	1 year	Class I (allowable deviation ±(0.0075ltl))	Manufacturer Technical Specification
			09-3180-01-04	0-1300 □	JZRX20132151	2013-5-27	1 year	Class I (allowable deviation ±(0.0075ltl))	Manufacturer Technical Specification
					JZRX201402497	2014-5-20	1 year	Class I (allowable deviation ±(0.0075ltl))	Manufacturer Technical Specification
					JZRX201502584	2015-5-14	1 year	Class I (allowable deviation ±(0.0075ltl))	Manufacturer Technical Specification

No	Name	Instrument type	SN	Scale	Calibration certificate	Calibration date	Calibration validity	Accuracy class	
								Accuracy class	Reference source
		Zhejiang Lunte H-WRNK-240-J	2012031767	-40-1100 □	JZRX20131826	2013-3-12	1 year	Class I ± 1.5 or ± 0.4%ltl	Manufacturer Technical Specification
					JZRX201402496	2014-3-5	1 year	Class I ± 1.5 or ± 0.4%ltl	Manufacturer Technical Specification
					JZRX201500847	2015-3-2	1 year	Class I ± 1.5 or ± 0.4%ltl	Manufacturer Technical Specification
5	Flare gas P	Rosemount 3051 TG1A2B21AB4E 5M5	4793856	0-207Kpa	JZYL20130106	2013-3-28	1 year	±0.075%	Manufacturer Technical Specification
					JZYL201401131	2014-3-21	1 year	±0.075%	Manufacturer Technical Specification
					JZYL201501456	2015-3-18	1 year	±0.075%	Manufacturer Technical Specification
6	Phase 1 engine gas P	Hefei Keheng Automation Instrument KH-AFY801	114932	0-40KPa	JZYL20130112	2013-3-28	1 year	±0.5%	Manufacturer Technical Specification
					JZYL201401132	2014-3-21	1 year	±0.5%	Manufacturer Technical Specification
					JZYL201501454	2015-3-18	1 year	±0.5%	Manufacturer Technical Specification
7	Phase 2 engine gas P	Rosemount 3051 TG1A2B21AB4E 5Q4	5466031	-20-20Kpa	JZYL20130111	2013-3-28	1 year	±0.075%	Manufacturer Technical Specification
					JZYL201401133	2014-3-21	1 year	±0.075%	Manufacturer Technical Specification
					JZYL201501455	2015-3-18	1 year	±0.075%	Manufacturer Technical Specification
8	Flare CH4%	Guardian plus, model: 97460	32624	0-100%	JZYL20130100	2013-3-28	1 year	±2.5%	Manufacturer Technical Specification
			34435	0-100%	JZYL201401143	2014-3-21	1 year	±2.5%	Manufacturer Technical Specification
			29787	0-100%	JZYL201402584	2014-5-19	1 year	±2.5%	Manufacturer Technical Specification
			26065	0-100%	JZYQ201500258	2015-5-8	1 year	±2.5%	Manufacturer Technical Specification
9	Phase 1 engine CH4%	Guardian plus, model: 97460	26062	0-100%	JZYL20130098	2013-3-28	1 year	±2.5%	Manufacturer Technical Specification
			32624	0-100%	JZYL201401142	2014-3-21	1 year	±2.5%	Manufacturer Technical Specification

No	Name	Instrument type	SN	Scale	Calibration certificate	Calibration date	Calibration validity	Accuracy class	
								Accuracy class	Reference source
			32624	0-100%	JZYQ201500187	2015-3-18	1 year	±2.5%	Manufacturer Technical Specification
10	Phase 2 engine CH4%	Guardian plus, model:97460	29782	0-100%	JZYL20130099	2013-3-28	1 year	±2.5%	Manufacturer Technical Specification
					JZYL201401144	2014-3-21	1 year	±2.5%	Manufacturer Technical Specification
					JZYQ201500185	2015-3-18	1 year	±2.5%	Manufacturer Technical Specification
11	Barometric pressure	Rosemount 3051 TA1A2B21JE5Q4	4980063	0-141.33 KPa	JZYL20130168	2013-5-6	1 year	±0.075%	Manufacturer Technical Specification
		Rosemount 3051 TA1A2B21JE5Q4	4980062	0-141.33 KPa	JZYL201401130	2014-3-21	1 year	±0.075%	Manufacturer Technical Specification
		Rosemount 3051 TA1A2B21JE5Q4	4980061	0-141.33 KPa	JZYL201501457	2015-3-18	1 year	±0.075%	Manufacturer Technical Specification
12	V-cone engine 1	MOORE-KINGWAYS (SHANGHAI)CONTROL SYSTEM CO.,LTD KVW08IIKC24FWN	7092005	237.5-1900 m3/hr	TE12-JZ1007	2012-4-18	2 year	±0.5%	Manufacturer Technical Specification
					LLYQ14-JZ1007	2014-4-3	2 year	±0.5%	Manufacturer Technical Specification
13	DP engines 1	Rosemount 3051 CD1A22A1AM5B4K5	4879836	0-6.22 KPa	JZYL20130110	2013-3-28	1 year	±0.075%	Manufacturer Technical Specification
		Rosemount 3051 CD1A22A1AM5B4K5	4870528	0-6.22 KPa	JZYL201401135	2014-3-21	1 year	±0.075%	Manufacturer Technical Specification
					JZYL201501467	2015-3-18	1 year	±0.075%	Manufacturer Technical Specification
14	V-cone engine 2	MOORE-KINGWAYS (SHANGHAI)CONTROL SYSTEM CO.,LTD KVW08IIKC24FWN	7092003	237.5-1900 m3/hr	TE12-JZ1009	2012-4-18	2 year	±0.5%	Manufacturer Technical Specification
					LLYQ14-JZ1009	2014-4-3	2 year	±0.5%	Manufacturer Technical Specification
15	DP engines 2	Rosemount 3051 CD1A22A1AM5B4K5	4879835	0-6.22 KPa	JZYL20130107	2013-3-28	1 year	±0.075%	Manufacturer Technical Specification
					JZYL201401137	2014-3-21	1 year	±0.075%	Manufacturer Technical Specification

No	Name	Instrument type	SN	Scale	Calibration certificate	Calibration date	Calibration validity	Accuracy class	
								Accuracy class	Reference source
					JZYL201501464	2015-3-18	1 year	±0.075%	Manufacturer Technical Specification
16	V-cone engine 3	MOORE-KINGWAYS (SHANGHAI)CONTROL SYSTEM CO.,LTD KVW08IIKC24FWN	7092004	237.5-1900 m3/hr	TE12-JZ1008	2012-4-18	2 year	±0.5%	Manufacturer Technical Specification
					LLYQ14-JZ1008	2014-4-3	2 year	±0.5%	Manufacturer Technical Specification
17	DP engines 3	Rosemount 3051 CD1A22A1AM5 B4K5	4870527	0-6.22 KPa	JZYL20130105	2013-3-28	1 year	±0.075%	Manufacturer Technical Specification
					JZYL201401136	2014-3-21	1 year	±0.075%	Manufacturer Technical Specification
					JZYL201501466	2015-3-18	1 year	±0.075%	Manufacturer Technical Specification
18	V-cone 1# for flare	MOORE-KINGWAYS (SHANGHAI)CONTROL SYSTEM CO.,LTD KVW10IIAB24FWN	7102301	250-3,000 m3/hr	TE12-JZ1006	2012-4-18	2 year	±0.5%	Manufacturer Technical Specification
			7102302	250-3,000 m3/hr	LLYQ14-JZ1005	2014-4-3	2 year	±0.5%	Manufacturer Technical Specification
19	DP 1# for flare	Rosemount 3051 CD1A22A1AM5 B4K5	4870526	0-6.22 KPa	JZYL20130109	2013-3-28	1 year	±0.075%	Manufacturer Technical Specification
					JZYL201401134	2014-3-21	1 year	±0.075%	Manufacturer Technical Specification
					JZYL201501459	2015-3-18	1 year	±0.075%	Manufacturer Technical Specification
20	V-cone 2# for flare	MOORE-KINGWAYS (SHANGHAI)CONTROL SYSTEM CO.,LTD KVW10IIAB24FWN	7102302	250-3,000 m3/hr	TE12-JZ1005	2012-4-18	2 year	±0.5%	Manufacturer Technical Specification
			7102301	250-3000 m3/hr	LLYQ14-JZ1006	2014-4-3	2 year	±0.5%	Manufacturer Technical Specification
21	DP 2# for flare	Rosemount 3051 CD1A22A1AM5 B4K5	4870528	0-6.22 KPa	JZYL20130108	2013-3-28	1 year	±0.075%	Manufacturer Technical Specification
		Rosemount 3051CD2A22A1AM5I5	5489467	0-6.22 KPa	JZYL201403470	2014-3-21	1 year	±0.075%	Manufacturer Technical Specification
					JZYL201501458	2015-3-18	1 year	±0.075%	Manufacturer Technical Specification
22	V-cone engine 4	Moore-Kingways (ShangHai)	9061201	200-2,000 m3/hr	TE12-JZ1003	2012-4-18	2 year	±0.5%	Manufacturer Technical Specification

No	Name	Instrument type	SN	Scale	Calibration certificate	Calibration date	Calibration validity	Accuracy class	
								Accuracy class	Reference source
		control system Co, Ltd. KVS06□KC23FSN			LLYQ14-JZ1003	2014-4-3	2 year	±0.5%	Manufacturer Technical Specification
23	DP engines 4	Rosemount 3051 CD1A22A1AM5 B4K5	5058739	0-6.216 KPa	JZYL20130104	2013-3-28	1 year	±0.075%	Manufacturer Technical Specification
					JZYL201401138	2014-3-21	1 year	±0.075%	Manufacturer Technical Specification
					JZYL201501465	2015-3-18	1 year	±0.075%	Manufacturer Technical Specification
24	V-cone engine 5	Moore-Kingways Shanghai Control SYSTEM CO. LTD KVS06□KC23FSN	9061203	200-2000 m3/hr	TE12-JZ1001	2012-4-18	2 year	±0.5%	Manufacturer Technical Specification
					LLYQ14-JZ1001	2014-4-3	2 year	±0.5%	Manufacturer Technical Specification
25	DP engines 5	Rosemount 3051 CD1A22A1AM5 B4K5	5058740	0-6.216 KPa	JZYL20130103	2013-3-28	1 year	±0.075%	Manufacturer Technical Specification
					JZYL201401141	2014-3-21	1 year	±0.075%	Manufacturer Technical Specification
					JZYL201501463	2015-3-18	1 year	±0.075%	Manufacturer Technical Specification
26	V-cone engine 6	Moore-Kingways Shanghai Control SYSTEM CO. LTD KVS06□KC23FSN	9061204	200-2,000 m3/hr	TE12-JZ1004	2012-4-18	2 year	±0.5%	Manufacturer Technical Specification
					LLYQ14-JZ1004	2014-4-3	2 year	±0.5%	Manufacturer Technical Specification
27	DP engines 6	Rosemount 3051 CD1A22A1AM5 B4K5	5058741	0-6.216 KPa	JZYL20130102	2013-3-28	1 year	±0.075%	Manufacturer Technical Specification
					JZYL201401139	2014-3-21	1 year	±0.075%	Manufacturer Technical Specification
					JZYL201501462	2015-3-18	1 year	±0.075%	Manufacturer Technical Specification
28	V-cone engine 7	Moore-Kingways Shanghai Control SYSTEM CO. LTD KVS06□KC23FSN	9061202	200-2000 m3/hr	TE12-JZ1002	2012-4-18	2 year	±0.5%	Manufacturer Technical Specification
					LLYQ14-JZ1002	2014-4-3	2 year	±0.5%	Manufacturer Technical Specification
29	DP engines 7	Rosemount 3051 CD2A22A1ADFE 5Q4	5525313	0-6.216 KPa	JZYL20130101	2013-3-28	1 year	±0.075%	Manufacturer Technical Specification
					JZYL201401140	2014-3-21	1 year	±0.075%	Manufacturer Technical Specification

No	Name	Instrument type	SN	Scale	Calibration certificate	Calibration date	Calibration validity	Accuracy class	
								Accuracy class	Reference source
					JZYL201501461	2015-3-18	1 year	±0.075%	Manufacturer Technical Specification
30	V-cone for oil	Moore-Kingways Shanghai Control SYSTEM CO. LTD KVW06IIAB24FWN	9102801	18000-180000 Kg/hr	LLYQ13-JZc0007	2013-8-9	2 year	±0.5%	Manufacturer Technical Specification
					LLYQ15-JZ5001	2015-5-5	2 year	±0.5%	Manufacturer Technical Specification
31	DP for oil	Rosemount: 3051CD2A22A1 AM5B4K5	4870525	0-62.2 KPa	JZYL20130368	2013-3-28	1 year	±0.075%	Manufacturer Technical Specification
					JZYL201403469	2014-3-21	1 year	±0.075%	Manufacturer Technical Specification
					JZYL201501460	2015-3-18	1 year	±0.075%	Manufacturer Technical Specification
32	T- Oil outlet	SBWZPK-241	611052	0-300 □	JZRX20132149	2013-5-27	1 year	Class A (allowable deviation ±(0.15+0.002ltl))	Manufacturer Technical Specification
					JZRX201402703	2014-5-20	1 year	Class A (allowable deviation ±(0.15+0.002ltl))	Manufacturer Technical Specification
					JZRX201502858	2015-5-14	1 year	Class A (allowable deviation ±(0.15+0.002ltl))	Manufacturer Technical Specification
33	T- Oil return	Shanghai automation instrument factory three ZPK-231（Pt100）	2013050801	0-200 □	JZRX20134123	2013-5-27	1 year	Class A (allowable deviation ±(0.15+0.002ltl))	Manufacturer Technical Specification
					JZRX201402702	2014-5-20	1 year	Class A (allowable deviation ±(0.15+0.002ltl))	Manufacturer Technical Specification
34	6.3KV power meter	Jiangsu linyang Electronics Co. Ltd DSSD71	0040		JZDN20131003	2013-5-23	1 year	Active power：0.5S/1.0	Manufacturer Technical Specification
			0073		JZDN201402060	2014-5-4	1 year	Active power：0.5S/1.0	Manufacturer Technical Specification
			0040		JZDX201502330	2015-4-23	1 year	Active power：0.5S/1.0	Manufacturer Technical Specification
35	35KV power meter	Weisheng Group DSSD331	11030599360019		JZDN20135086	2013-5-23	1 year	Active power：0.2S	Manufacturer Technical Specification
			09080130690001		JZDN201402061	2014-5-4	1 year	Active power：0.2S	Manufacturer Technical Specification
			11030599360019		JZDX201502331	2015-4-23	1 year	Active power：0.2S	Manufacturer Technical Specification

Appendix 3. CDM Instruments removal and installation dates

Table A3.1 Removal and installation dates 2013

No.	Name	Instrument type	SN	Scale	Removal date calibration	Calibration date	Installation date after calibration
1	Flare gas T	shanghai Hongda WZPK（Pt100）	070907963	0-100□	2013-5-25	2013-5-27	2013-6-9
2	Phase 1 engine gas T	Anhui Tiankang WZP-240 (Pt100)	-	-200-450□	2013-5-29	-	-
		WZP-240(PT100)	908273	-200-450□	-	2013-5-27	2013-5-29
3	Phase 2 engine gas T	Zhejiang Lunte WZPK-270	2012031768	-200-350□	2013-5-29	-	-
		Honeywell STT830-171-TC.M1.W1.CD-WEEO-H06S-R2U6-A05TR080-2D-000	080625368	0-100□	-	2013-5-27	2013-5-29
4	Flare thermal couples	Honeywell STT830-173-TC.M3.W1.CD-WEEO-H10S-T7G6-A05T(Y)240-2D-000	080609834	0-1300□	2013-5-25	2013-5-27	2013-6-9
			09-3180-01-04	0-1300□	2013-5-25	2013-5-27	2013-6-9
		Zhejiang Lunte H-WRNK-240-J	2012031767	0-1300□	2013-3-10	2013-3-12	2013-3-19
5	Flare gas P	Rosemount 3051 TG1A2B21AB4E5M5	4793856	0-207 kPa	-	2013-3-28	Calibrated on site
6	Phase 1 engine gas P	Hefei Keheng Automation Instrument KH-AFY801	114932	0-40 kPa	-	2013-3-28	Calibrated on site
7	Phase 2 engine gas P	Rosemount 3051 TG1A2B21AE5Q4	5210414	0-20Kpa	2013-3-28	-	-
			5466031	-20-20Kpa	-	2013-3-28	2013-3-28
8	Flare CH4%	Guardian plus, model: 97460	32624	0-100%	-	2013-3-28	Calibrated on site
9	Phase 1 engine CH4%	Guardian plus, model: 97460	26062	0-100%	-	2013-3-28	Calibrated on site
10	Phase 2 engine CH4%	Guardian plus, model: 97460	29782	0-100%	-	2013-3-28	Calibrated on site
11	Barometric pressure	Rosemount 3051 TA1A2B21AB4E5Q4	1794561	0-207 kPa	2013-5-11	-	-
		Rosemount 3051 TA1A2B21JE5Q4	4980063	0-141.33 Kpa	-	2013-5-6	2013-5-11
12	V-cone engine 1	Moore-Kingways control system Co, Ltd. KVW08IIKC24FWN	7092005	237.5-1900 m3/hr	-	-	-
13	DP engines 1	Rosemount 3051 CD1A22A1AM5B4K5	4879836	0-6.22 kPa	-	2013-3-28	Calibrated on site
14	V-cone engine 2	Moore-Kingways control system Co, Ltd. KVW08IIKC24FWN	7092003	237.5-1900 m3/hr	-	-	-

No.	Name	Instrument type	SN	Scale	Removal date calibration	Calibration date	Installation date after calibration
15	DP engines 2	Rosemount 3051 CD1A22A1AM5B4K5	4879835	0-6.22 kPa	-	2013-3-28	Calibrated on site
16	V-cone engine 3	Moore-Kingways control system Co, Ltd. KVW08IIKC24FWN	7092004	237.5-1900 m3/hr	-	-	-
17	DP engines 3	Rosemount 3051 CD1A22A1AM5B4K5	4870527	0-6.22 kPa	-	2013-3-28	Calibrated on site
18	V-cone 1# flare	Moore-Kingways control system Co, Ltd. KVW10IIAB24FWN	7102301	250-3000 m3/hr	-	-	-
19	DP 1# flare	Rosemount 3051 CD1A22A1AM5B4K5	4870526	0-6.22 kPa	-	2013-3-28	Calibrated on site
20	V-cone 2# flare	Moore-Kingways control system Co, Ltd. KVW10IIAB24FWN	7102302	250-3000 m3/hr	-	-	-
21	DP 2# flare	Rosemount 3051 CD1A22A1AM5B4K5	4870528	0-6.22 kPa	-	2013-3-28	Calibrated on site
22	V-cone engine 4	Moore-Kingways control system Co, Ltd. KVS06□KC23FSN	9061201	200-2000 m3/hr	-	-	-
23	DP engines 4	Rosemount 3051 CD1A22A1AM5B4K5	5058739	0-6.216 kPa	-	2013-3-28	Calibrated on site
24	V-cone engine 5	Moore-Kingways control system Co, Ltd. KVS06□KC23FSN	9061203	200-2000 m3/hr	-	-	-
25	DP engines 5	Rosemount 3051 CD1A22A1AM5B4K5	5058740	0-6.216 kPa	-	2013-3-28	Calibrated on site
26	V-cone engine 6	Moore-Kingways (control system Co, Ltd. KVS06□KC23FSN	9061204	200-2000 m3/hr	-	-	-
27	DP engines 6	Rosemount 3051 CD1A22A1AM5B4K5	5058741	0-6.216 kPa	-	2013-3-28	Calibrated on site
28	V-cone engine 7	Moore-Kingways control system Co, Ltd. KVS06□KC23FSN	9061202	200-2000 m3/hr	-	-	-
29	DP engines 7	Rosemount 3051 CD2A22A1ADFE5Q4	5525313	0-6.216Kpa	-	2013-3-28	Calibrated on site
30	V-cone for oil	Moore-Kingways control system Co, Ltd. KVW06IIAB24FWN	9102801	18000-180000 Kg/hr	2013-8-7	2013-8-9	2013-9-13
31	DP for oil	Rosemount: 3051CD2A22A1AM5B4K5	4870525	0-62.2 kPa	-	2013-3-28	Calibrated on site
32	T- Oil outlet	SBWZPK-241	611052	0-300□	2013-5-25	2013-5-27	2013-6-9
33	T- Oil return	Shanghai Hongda WZPK（Pt100）	070907964	0-200□	2013-5-25	-	-
		Shanghai automation instrument factory three ZPK-231（Pt100）	2013050801	0-200 □	-	2013-5-27	2013-6-9
34	6.3KV power meter	Jiangsu linyang Electronics Co., Ltd DSSD71	0073		2013-6-9	-	-
			0040		-	2013-5-23	2013-6-9
35	35KV power	Weisheng Group DSSD331	09080130690001		2013-6-9	-	-

No.	Name	Instrument type	SN	Scale	Removal date calibration	Calibration date	Installation date after calibration
	meter		11030599360019		-	2013-5-23	2013-6-9

Table A3.2 Removal and installation dates 2014

No.	Name	Instrument type	SN	Scale	Removal date calibration	Calibration date	Installation date after calibration
1	Flare gas T	shanghai Hongda WZPK（Pt100）	070907963	0-100□	2014-5-19	2014-5-20	2014-5-23
2	Phase 1 engine gas T	WZP-240(PT100)	908273	-200-450□	2014-5-23	-	-
		Anhui Tiankang WZP-240 (Pt100)	-	-200-450□	-	2014-5-20	2014-5-23
3	Phase 2 engine gas T	Honeywell STT830-171-TC.M1.W1.CD-WEEO-H06S-R2U6-A05TR080-2D-000	080625368	0-100□	2014-5-23	-	-
		Zhejiang Lunte WZPK-270	2012031768	-200-350□	-	2014-5-20	2014-5-23
4	Flare thermal couples	Honeywell STT830-173-TC.M3.W1.CD-WEEO-H10S-T7G6-A05T(Y)240-2D-000	080609834	0-1300□	2014-5-19	2014-5-20	2014-5-23
			09-3180-01-04	0-1300□	2014-5-19	2014-5-20	2014-5-23
		Zhejiang Lunte H-WRNK-240-J	2012031767	0-1300□	2014-3-3	2014-3-5	2014-3-7
5	Flare gas P	Rosemount 3051 TG1A2B21AB4E5M5	4793856	0-207 kPa	Calibrated on site	2014-3-21	Calibrated on site
6	Phase 1 engine gas P	Hefei Keheng Automation Instrument KH-AFY801	114932	0-40 kPa	Calibrated on site	2014-3-21	Calibrated on site
7	Phase 2 engine gas P	Rosemount 3051 TG1A2B21AE5Q4	5466031	-20-20 kPa	Calibrated on site	2014-3-21	Calibrated on site
8	Flare CH4%	Guardian plus, model:97460	32624	0-100%	2014-3-21	-	-
		Guardian plus, model:97460	34435	0-100%	Calibrated on site	2014-3-21	Calibrated on site
		Guardian plus, model:97460	26065	0-100%	-	-	-
9	Phase 1 engine CH4%	Guardian plus, model:97460	26062	0-100%	2014-3-21	-	-
		Guardian plus, model:97460	32624	0-100%	Calibrated on site	2014-3-21	Calibrated on site
10	Phase 2 engine CH4%	Guardian plus, model:97460	29782	0-100%	Calibrated on site	2014-3-21	Calibrated on site
11	Barometric pressure	Rosemount 3051 TA1A2B21JE5Q4	4980063	0-141.33 kPa	2014-4-4	-	-
		Rosemount 3051 TA1A2B21JE5Q4	4980062	0-141.33 kPa	-	2014-3-21	2014-4-4
		Rosemount TA1A2B21JE5Q4	4980061	0-141.33 kPa	-	-	-
12	V-cone engine 1	Moore-Kingways (ShangHai) control system Co, Ltd. KVW08IIKC24FWN	7092005	237.5-1900 m3/hr	2014-4-2	2014-4-3	2014-4-4

No.	Name	Instrument type	SN	Scale	Removal date calibration	Calibration date	Installation date after calibration
13	DP engines 1	Rosemount 3051 CD1A22A1AM5B4K5	4879836	0-6.22 kPa	2014-3-21	-	-
		Rosemount 3051 CD1A22A1AM5B4K5	4870528	0-6.22 kPa	Calibrated on site	2014-3-21	Calibrated on site
14	V-cone engine 2	Moore-Kingways (ShangHai) control system Co, Ltd. KVW08IIKC24FWN	7092003	237.5-1900 m3/hr	2014-4-2	2014-4-3	2014-4-4
15	DP engines 2	Rosemount 3051 CD1A22A1AM5B4K5	4879835	0-6.22 kPa	Calibrated on site	2014-3-21	Calibrated on site
16	V-cone engine 3	Moore-Kingways (ShangHai) control system Co, Ltd. KVW08IIKC24FWN	7092004	237.5-1900 m3/hr	2014-4-2	2014-4-3	2014-4-4
17	DP engines 3	Rosemount 3051 CD1A22A1AM5B4K5	4870527	0-6.22 kPa	Calibrated on site	2014-3-21	Calibrated on site
18	V-cone 1# flare	Moore-Kingways (ShangHai) control system Co, Ltd. KVW10IIAB24FWN	7102301	250-3000 m3/hr	2014-4-2	2014-4-3	2014-4-4
19	DP 1# flare	Rosemount 3051 CD1A22A1AM5B4K5	4870526	0-6.22 kPa	Calibrated on site	2014-3-21	Calibrated on site
20	V-cone 2# flare	Moore-Kingways (ShangHai) control system Co, Ltd. KVW10IIAB24FWN	7102302	250-3000 m3/hr	2014-4-2	2014-4-3	-
21	DP 2# flare	Rosemount 3051 CD1A22A1AM5B4K5	4870528	0-6.22 kPa	2014-3-21	-	-
		Rosemount 3051CD2A22A1AM5I5	5489467	0-6.22 kPa	Calibrated on site	2014-3-21	Calibrated on site
22	V-cone engine 4	Moore-Kingways (ShangHai) control system Co, Ltd. KVS06□KC23FSN	9061201	200-2000 m3/hr	2014-4-2	2014-4-3	2014-4-4
23	DP engines 4	Rosemount 3051 CD1A22A1AM5B4K5	5058739	0-6.216 kPa	Calibrated on site	2014-3-21	Calibrated on site
24	V-cone engine 5	Moore-Kingways (ShangHai) control system Co, Ltd. KVS06□KC23FSN	9061203	200-2000 m3/hr	2014-4-2	2014-4-3	2014-4-4
25	DP engines 5	Rosemount 3051 CD1A22A1AM5B4K5	5058740	0-6.216 kPa	Calibrated on site	2014-3-21	Calibrated on site
26	V-cone engine 6	Moore-Kingways (ShangHai) control system Co, Ltd. KVS06□KC23FSN	9061204	200-2000 m3/hr	2014-4-2	2014-4-3	2014-4-4
27	DP engines 6	Rosemount 3051 CD1A22A1AM5B4K5	5058741	0-6.216 kPa	Calibrated on site	2014-3-21	Calibrated on site
28	V-cone engine 7	Moore-Kingways (ShangHai) control system Co, Ltd. KVS06□KC23FSN	9061202	200-2000 m3/hr	2014-4-2	2014-4-3	2014-4-4
29	DP engines 7	Rosemount 3051 CD2A22A1ADFE5Q4	5525313	0-6.216Kpa	Calibrated on site	2014-3-21	Calibrated on site
30	V-cone for oil	Moore-Kingways (ShangHai) control system Co, Ltd. KVW06IIAB24FWN	9102801	18,000-180,000 Kg/hr	-	-	-
31	DP for oil	Rosemount: 3051CD2A22A1AM5B4K5	4870525	0-62.2 kPa	Calibrated on site	2014-3-21	Calibrated on site
32	T- Oil outlet	SBWZPK-241	611052	0-300□	2014-5-19	2014-5-20	2014-5-29
33	T- Oil return	Shanghai automation instrument factory three ZPK-231 (Pt100)	2013050801	0-200 □	2014-5-19	2014-5-20	2014-5-29

No.	Name	Instrument type	SN	Scale	Removal date calibration	Calibration date	Installation date after calibration
34	6.3KV power meter	Jiangsu linyang Electronics Co., Ltd DSSD71	0040		2014-5-5	-	-
			0073		-	2014-5-4	2014-5-5
35	35KV power meter	Weisheng Group DSSD331	11030599360019		2014-5-5	-	-
			09080130690001		-	2014-5-4	2014-5-5

Table A3.3 Removal and installation dates 2015

No.	Name	Instrument type	SN	Scale	Removal date calibration	Calibration date	Installation date after calibration
1	Flare gas T	Shanghai Hongda WZPK（Pt100）	070907963	0-100□	2015-5-13	2015-5-14	2015-5-19
2	Phase 1 engine gas T	WZP-240 (PT100)	908273	-200-450□	-	2015-5-14	2015-5-19
		Anhui Tiankang WZP-240 (Pt100)	----	-200-450□	2015-5-19	-	-
3	Phase 2 engine gas T	Honeywell STT830-171-TC.M1.W1.CD-WEEO-H06S-R2U6-A05TR080-2D-000	080625368	0-100□	-	2015-5-14	2015-5-19
		Zhejiang Lunte WZPK-270	2012031768	-200-350□	2015-5-19	-	-
4	Flare thermal couples	Honeywell STT830-173-TC.M3.W1.CD-WEEO-H10S-T7G6-A05T(Y)240-2D-000	080609834	0-1300□	2015-5-7	2015-5-14	-
			09-3180-01-04	0-1300□	2015-5-7	2015-5-14	-
		Zhejiang Lunte H-WRNK-240-J	2012031767	0-1300□	2015-3-1	2015-3-2	2015-3-26
5	Flare gas P	Rosemount 3051 TG1A2B21AB4E5M5	4793856	0-207 kPa	Calibrated on site	2015-3-18	Calibrated on site
6	Phase 1 engine gas P	Hefei Keheng Automation Instrument KH-AFY801	114932	0-40 kPa	Calibrated on site	2015-3-18	Calibrated on site
7	Phase 2 engine gas P	Rosemount 3051 TG1A2B21AE5Q4	5466031	-20-20Kpa	Calibrated on site	2015-3-18	Calibrated on site
8	Flare CH4%	Guardian plus, model 97460	32624	0-100%	-	-	-
		Guardian plus, model 97460	34435	0-100%	2015-3-26	-	-
		Guardian plus, model 97460	29787	0-100%	-	-	Installed on 2015-3-26, removed on 2015-5-14
		Guardian plus, model 97460	26065	0-100%	Calibrated on site	2015-5-8	Calibrated on site
9	Phase 1 engine	Guardian plus, model 97460	26062	0-100%	-	-	-

No.	Name	Instrument type	SN	Scale	Removal date calibration	Calibration date	Installation date after calibration
	CH4%	Guardian plus, model 97460	32624	0-100%	Calibrated on site	2015-3-18	Calibrated on site
10	Phase 2 engine CH4%	Guardian plus, model 97460	29782	0-100%	Calibrated on site	2015-3-18	Calibrated on site
11	Barometric pressure	Rosemount 3051 TA1A2B21JE5Q4	4980063	0-141.33 Kpa	-	-	-
		Rosemount 3051 TA1A2B21JE5Q4	4980062	0-141.33 Kpa	2015-3-27	-	-
		Rosemount TA1A2B21JE5Q4	4980061	0-141.33 kPa	-	2015-3-18	2015-3-27
12	V-cone engine 1	MOORE-KINGWAYS (SHANGHAI)CONTROL SYSTEM CO.,LTD KVW08IIKC24FWN	7092005	237.5-1900 m3/hr	-	-	-
13	DP engines 1	Rosemount 3051 CD1A22A1AM5B4K5	4879836	0-6.22 kPa	-	-	-
		Rosemount 3051 CD1A22A1AM5B4K5	4870528	0-6.22 kPa	Calibrated on site	2015-3-18	Calibrated on site
14	V-cone engine 2	MOORE-KINGWAYS (SHANGHAI)CONTROL SYSTEM CO.,LTD KVW08IIKC24FWN	7092003	237.5-1900 m3/hr	-	-	-
15	DP engines 2	Rosemount 3051 CD1A22A1AM5B4K5	4879835	0-6.22 kPa	Calibrated on site	2015-3-18	Calibrated on site
16	V-cone engine 3	MOORE-KINGWAYS (SHANGHAI)CONTROL SYSTEM CO.,LTD KVW08IIKC24FWN	7092004	237.5-1900 m3/hr	-	-	-
17	DP engines 3	Rosemount 3051 CD1A22A1AM5B4K5	4870527	0-6.22 kPa	Calibrated on site	2015-3-18	Calibrated on site
18	V-cone 1# flare	MOORE-KINGWAYS (SHANGHAI)CONTROL SYSTEM CO.,LTD KVW10IIAB24FWN	7102301	250-3000 m3/hr	-	-	-
19	DP 1# flare	Rosemount 3051 CD1A22A1AM5B4K5	4870526	0-6.22 kPa	Calibrated on site	2015-3-18	Calibrated on site
20	V-cone 2# flare	MOORE-KINGWAYS (SHANGHAI)CONTROL SYSTEM CO.,LTD KVW10IIAB24FWN	7102302	250-3000 m3/hr	-	-	-
21	DP 2# flare	Rosemount 3051 CD1A22A1AM5B4K5	4870528	0-6.22 kPa	-	-	-
		Rosemount 3051CD2A22A1AM5I5	5489467	0-6.22 kPa	Calibrated on site	2015-3-18	Calibrated on site
22	V-cone engine 4	Moore-Kingways (ShangHai) control system Co, Ltd. KVS06□KC23FSN	9061201	200-2000 m3/hr	-	-	-
23	DP engines 4	Rosemount 3051 CD1A22A1AM5B4K5	5058739	0-6.216 kPa	Calibrated on site	2015-3-18	Calibrated on site
24	V-cone engine 5	Moore-Kingways (ShangHai) control system Co, Ltd. KVS06□KC23FSN	9061203	200-2000 m3/hr	-	-	-

No.	Name	Instrument type	SN	Scale	Removal date calibration	Calibration date	Installation date after calibration
25	DP engines 5	Rosemount 3051 CD1A22A1AM5B4K5	5058740	0-6.216 kPa	Calibrated on site	2015-3-18	Calibrated on site
26	V-cone engine 6	Moore-Kingways (ShangHai) control system Co, Ltd. KVS06□KC23FSN	9061204	200-2000 m3/hr	-	-	-
27	DP engines 6	Rosemount 3051 CD1A22A1AM5B4K5	5058741	0-6.216 kPa	Calibrated on site	2015-3-18	Calibrated on site
28	V-cone engine 7	Moore-Kingways (ShangHai) control system Co, Ltd. KVS06□KC23FSN	9061202	200-2000 m3/hr	-	-	-
29	DP engines 7	Rosemount 3051 CD2A22A1ADFE5Q4	5525313	0-6.216Kpa	Calibrated on site	2015-3-18	Calibrated on site
30	V-cone for oil	MOORE-KINGWAYS (SHANGHAI)CONTROL SYSTEM CO.,LTD KVW06IIAB24FWN	9102801	18000-180000 Kg/hr	2015-5-4	2015-5-5	2015-5-15
31	DP for oil	Rosemount: 3051CD2A22A1AM5B4K5	4870525	0-62.2 kPa	Calibrated on site	2015-3-18	Calibrated on site
32	T- Oil outlet	SBWZPK-241	611052	0-300□	2014-5-13	2015-5-14	-
33	T- Oil return	Shanghai automation instrument factory three ZPK-231（Pt100）	2013050801	0-200 □	-	-	-
34	6.3KV power meter	Jiangsu linyang Electronics Co., Ltd DSSD71	0040		-	2015-4-23	2015-4-24
			0073		2015-4-24	-	-
35	35KV power meter	Weisheng Group DSSD331	11030599360019		-	2015-4-23	2015-4-24
			09080130690001		2015-4-24	-	-

Appendix 4. Special CDM data events

Start time (GMT)	End time (GMT)	Length of event (hh:mm:ss)	Event / Cause	Action taken
2014-3-16 1:00:00	2014-3-30 18:00:00	353:00:00	DP signal of heat recovery system lost	No ER from heat recovery claimed
2014-03-22 02:00:00	2014-03-23 10:00:00	33:00:00	35KV fault - power generation through 6KV	No action required
2014-03-25 00:00:00	2014-03-25 11:00:00	12:00:00	35KV fault - power generation through 6KV	No action required
2014-03-27 00:00:00	2014-03-27 07:00:00	8:00:00	35KV fault - power generation through 6KV	No action required
2014-03-28 00:00:00	2014-03-28 13:00:00	14:00:00	35KV fault - power generation through 6KV	No action required
2014-03-29 00:00:00	2014-03-29 10:00:00	11:00:00	35KV fault - power generation through 6KV	No action required
2014-03-30 00:00:00	2014-03-30 07:00:00	8:00:00	35KV fault - power generation through 6KV	No action required
2014-08-07 21:00:00	2014-08-11 06:00:00	82:00:00	35KV fault - power generation through 6KV	No action required
2014-11-12 15:00:00	2014-11-13 00:00:00	10:00:00	35KV fault - power generation through 6KV	No action required
2014-11-25 01:00:00	2014-11-25 07:00:00	7:00:00	35KV fault - power generation through 6KV	No action required
2014-12-03 06:00:00	2014-12-03 09:00:00	4:00:00	35KV fault - power generation through 6KV	No action required
2014-12-15 19:00:00	2014-12-17 11:00:00	41:00:00	35KV fault - power generation through 6KV	No action required
2015-01-10 13:00:00	2015-01-11 07:00:00	19:00:00	35KV fault - power generation through 6KV	No action required
2015-3-18 12:51:00	2015-3-26 02:48:00	181:58:00	Flare Guardian plus fault	Replace Flare CH4 by pre-treatment 1 CH4 while flare running
2015-03-30 01:00:00	2015-03-30 11:00:00	11:00:00	35KV fault - power generation through 6KV	No action required
2015-03-31 00:00:00	2015-03-31 10:00:00	11:00:00	35KV fault - power generation through 6KV	No action required
2015-04-03 00:00:00	2015-04-03 11:00:00	12:00:00	35KV fault - power generation through 6KV	No action required

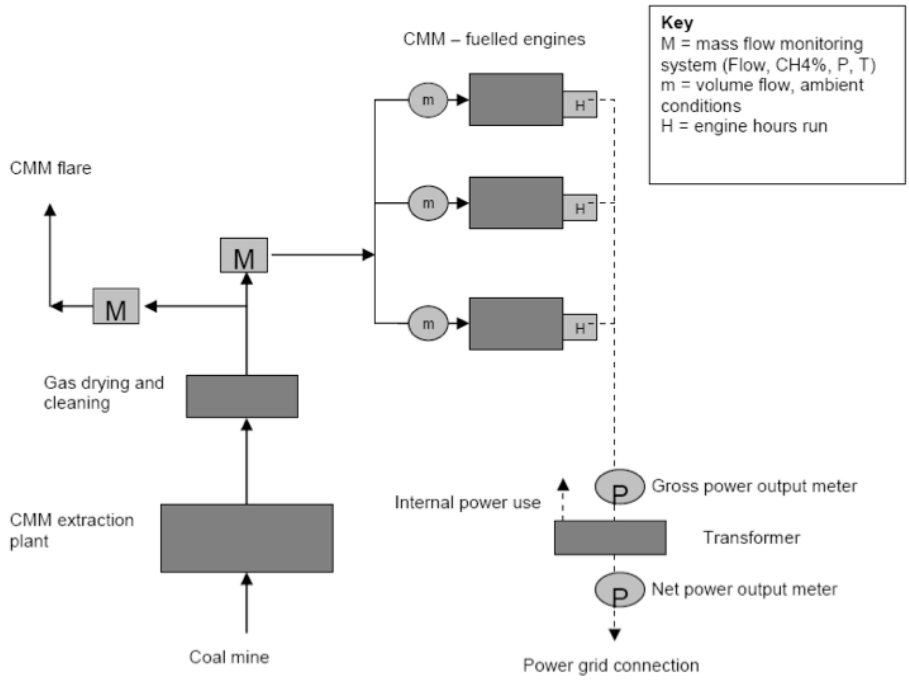
Appendix 5. Missing CDM data events

Start time (GMT)	End time (GMT)	Length of event (hh:mm:ss)
2014-03-21 03:00:00	2014-03-21 09:00:00	07:00:00
2014-05-08 06:00:00	2014-05-08 07:00:00	02:00:00
2014-05-14 00:00:00	2014-05-14 05:00:00	06:00:00
2014-07-02 06:00:00	2014-07-02 10:00:00	05:00:00
2014-09-28 07:00:00	2014-09-28 23:00:00	17:00:00
2014-10-15 00:00:00	2014-10-15 03:00:00	04:00:00
2014-12-08 17:00:00	2014-12-08 23:00:00	07:00:00
2015-04-02 03:00:00	2015-04-02 04:00:00	02:00:00
2015-05-12 00:00:00	2015-05-12 04:00:00	05:00:00
2015-05-13 00:00:00	2015-05-13 04:00:00	05:00:00

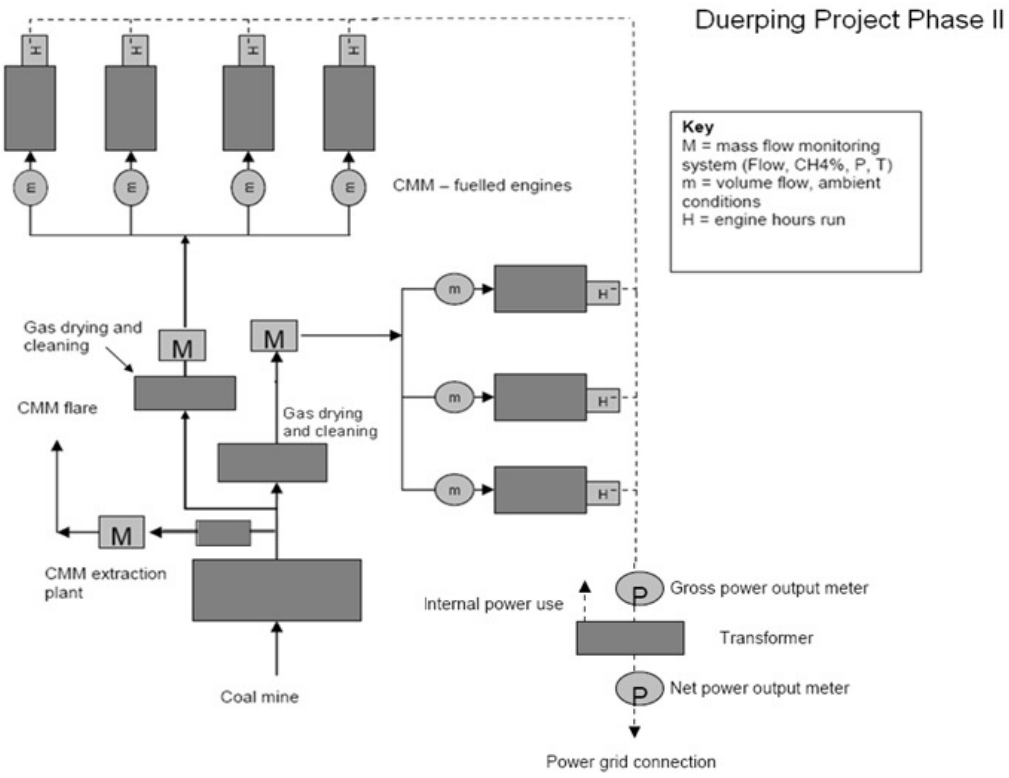
Appendix 6. Process flow diagrams

The locations of methane flow monitoring to the CMM utilization plant are shown in the schematic below. Monitoring of the waste heat supply from the engines to the shaft heater has been excluded from the diagram for clarity.

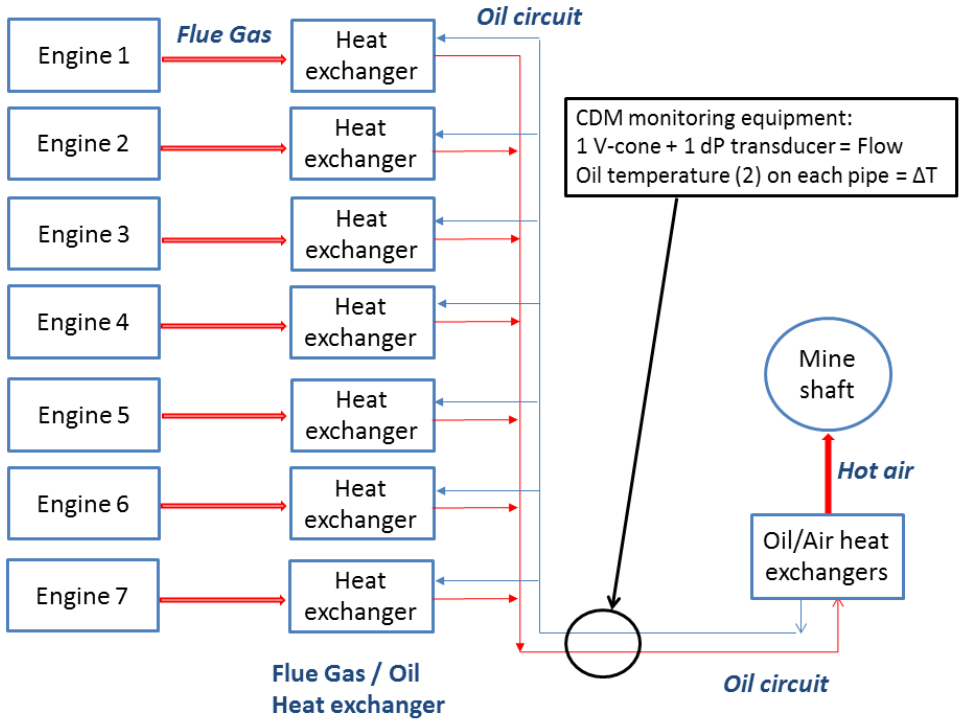
Schematic Flow Diagram showing implementation Phase 1:



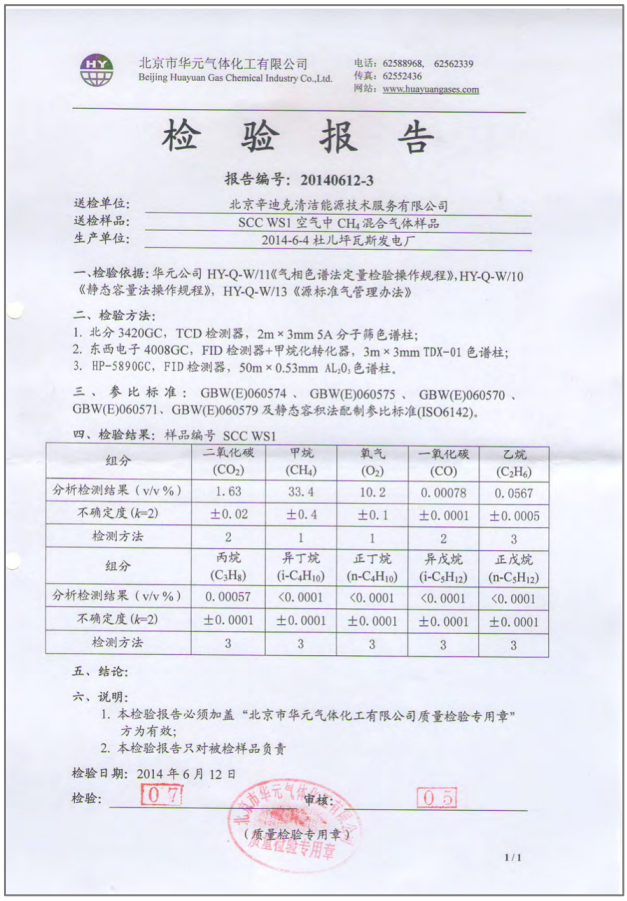
Schematic flow diagram showing completed project:



Schematic flow diagram showing heat recovery system:



Appendix 7. Gas sample analysis



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检 验 报 告

报告编号：20140612-3

送检单位：北京辛迪克清洁能源技术服务有限公司
送检样品：SCC WS1 空气中 CH_4 混合气体样品
生产单位：2014-6-4 杜儿坪瓦斯发电厂

一、检验依据：华元公司 HY-Q-W/11《气相色谱法定量检验操作规程》，HY-Q-W/10《静态容量法操作规程》，HY-Q-W/13《源标准气管理办法》

二、检验方法：
1. 北分 3420GC，TCD 检测器，2m × 3mm 5A 分子筛色谱柱；
2. 东西电子 4008GC，FID 检测器+甲烷化转化器，3m × 3mm TDX-01 色谱柱；
3. HP-5890GC，FID 检测器，50m × 0.53mm AL_2O_3 色谱柱。

三、参比标准：GBW(E)060574、GBW(E)060575、GBW(E)060570、GBW(E)060571、GBW(E)060579 及静态容积法配制参比标准(ISO6142)。

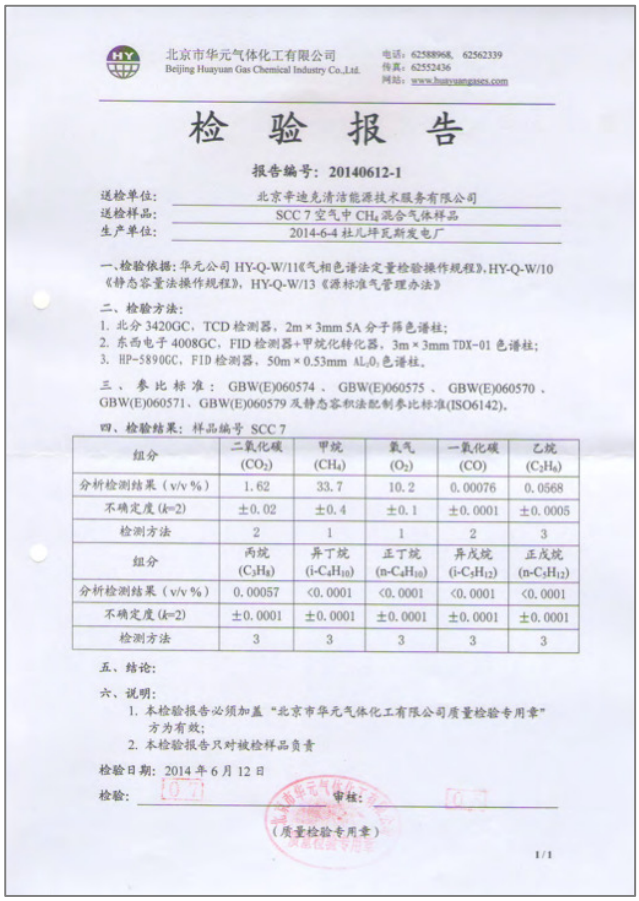
四、检验结果：样品编号 SCC WS1

组分	二氧化碳 (CO_2)	甲烷 (CH_4)	氧气 (O_2)	一氧化碳 (CO)	乙烷 (C_2H_6)
分析检测结果（v/v %）	1.63	33.4	10.2	0.00078	0.0567
不确定度（k=2）	±0.02	±0.4	±0.1	±0.0001	±0.0005
检测方法	2	1	1	2	3
组分	丙烷 (C_3H_8)	异丁烷 ($i\text{-}C_4H_{10}$)	正丁烷 ($n\text{-}C_4H_{10}$)	异戊烷 ($i\text{-}C_5H_{12}$)	正戊烷 ($n\text{-}C_5H_{12}$)
分析检测结果（v/v %）	0.00057	<0.0001	<0.0001	<0.0001	<0.0001
不确定度（k=2）	±0.0001	±0.0001	±0.0001	±0.0001	±0.0001
检测方法	3	3	3	3	3

五、结论：

六、说明：
1. 本检验报告必须加盖“北京市华元气体化工有限公司质量检验专用章”方为有效；
2. 本检验报告只对被检样品负责

检验日期：2014 年 6 月 12 日
检验：07　审核：05
（质量检验专用章）
1/1



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检 验 报 告

报告编号：20140612-1

送检单位：北京辛迪克清洁能源技术服务有限公司
送检样品：SCC 7 空气中 CH_4 混合气体样品
生产单位：2014-6-4 杜儿坪瓦斯发电厂

一、检验依据：华元公司 HY-Q-W/11《气相色谱法定量检验操作规程》，HY-Q-W/10《静态容量法操作规程》，HY-Q-W/13《源标准气管理办法》

二、检验方法：
1. 北分 3420GC，TCD 检测器，2m × 3mm 5A 分子筛色谱柱；
2. 东西电子 4008GC，FID 检测器+甲烷化转化器，3m × 3mm TDX-01 色谱柱；
3. HP-5890GC，FID 检测器，50m × 0.53mm AL_2O_3 色谱柱。

三、参比标准：GBW(E)060574、GBW(E)060575、GBW(E)060570、GBW(E)060571、GBW(E)060579 及静态容积法配制参比标准(ISO6142)。

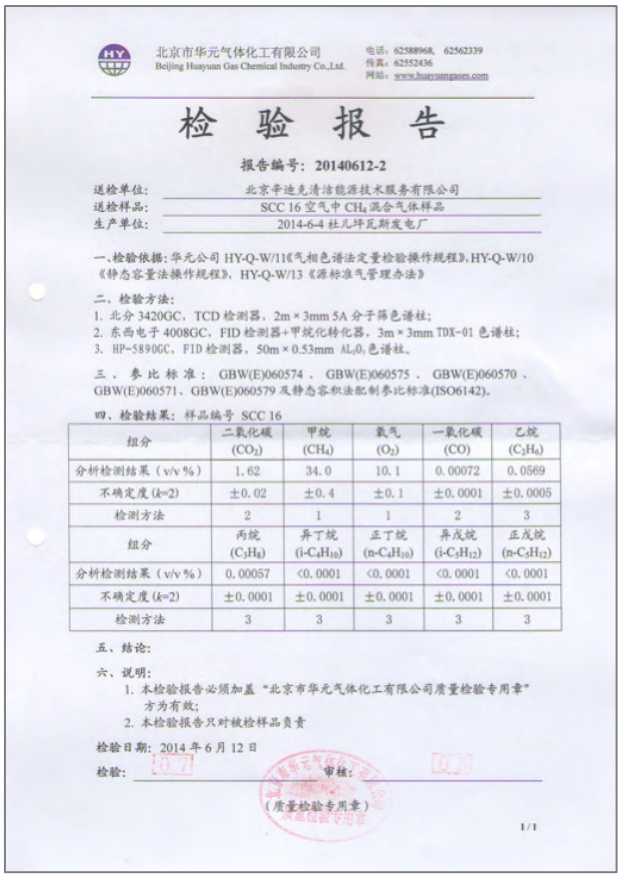
四、检验结果：样品编号 SCC 7

组分	二氧化碳 (CO_2)	甲烷 (CH_4)	氧气 (O_2)	一氧化碳 (CO)	乙烷 (C_2H_6)
分析检测结果（v/v %）	1.62	33.7	10.2	0.00076	0.0568
不确定度（k=2）	±0.02	±0.4	±0.1	±0.0001	±0.0005
检测方法	2	1	1	2	3
组分	丙烷 (C_3H_8)	异丁烷 ($i\text{-}C_4H_{10}$)	正丁烷 ($n\text{-}C_4H_{10}$)	异戊烷 ($i\text{-}C_5H_{12}$)	正戊烷 ($n\text{-}C_5H_{12}$)
分析检测结果（v/v %）	0.00057	<0.0001	<0.0001	<0.0001	<0.0001
不确定度（k=2）	±0.0001	±0.0001	±0.0001	±0.0001	±0.0001
检测方法	3	3	3	3	3

五、结论：

六、说明：
1. 本检验报告必须加盖“北京市华元气体化工有限公司质量检验专用章”方为有效；
2. 本检验报告只对被检样品负责

检验日期：2014 年 6 月 12 日
检验：07　审核：
（质量检验专用章）
1/1



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检 验 报 告

报告编号：20140612-2

送检单位：北京辛迪克清洁能源技术服务有限公司
送检样品：SCC 16 空气中 CH_4 混合气体样品
生产单位：2014-6-4 杜儿坪瓦斯发电厂

一、检验依据：华元公司 HY-Q-W/11《气相色谱法定量检验操作规程》，HY-Q-W/10《静态容量法操作规程》，HY-Q-W/13《源标准气管理办法》

二、检验方法：
1. 北分 3420GC，TCD 检测器，2m × 3mm 5A 分子筛色谱柱；
2. 东西电子 4008GC，FID 检测器+甲烷化转化器，3m × 3mm TDX-01 色谱柱；
3. HP-5890GC，FID 检测器，50m × 0.53mm AL_2O_3 色谱柱。

三、参比标准：GBW(E)060574、GBW(E)060575、GBW(E)060570、GBW(E)060571、GBW(E)060579 及静态容积法配制参比标准(ISO6142)。

四、检验结果：样品编号 SCC 16

组分	二氧化碳 (CO_2)	甲烷 (CH_4)	氧气 (O_2)	一氧化碳 (CO)	乙烷 (C_2H_6)
分析检测结果（v/v %）	1.62	34.0	10.1	0.00072	0.0569
不确定度（k=2）	±0.02	±0.4	±0.1	±0.0001	±0.0005
检测方法	2	1	1	2	3
组分	丙烷 (C_3H_8)	异丁烷 ($i\text{-}C_4H_{10}$)	正丁烷 ($n\text{-}C_4H_{10}$)	异戊烷 ($i\text{-}C_5H_{12}$)	正戊烷 ($n\text{-}C_5H_{12}$)
分析检测结果（v/v %）	0.00057	<0.0001	<0.0001	<0.0001	<0.0001
不确定度（k=2）	±0.0001	±0.0001	±0.0001	±0.0001	±0.0001
检测方法	3	3	3	3	3

五、结论：

六、说明：
1. 本检验报告必须加盖“北京市华元气体化工有限公司质量检验专用章”方为有效；
2. 本检验报告只对被检样品负责

检验日期：2014 年 6 月 12 日
检验：07　审核：
（质量检验专用章）
1/1

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Document information

Version	*Date*	*Description*
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: • Include provisions related to delayed submission of a monitoring plan; • Provisions related to the Host Party; • Remove reference to programme of activities; • Overall editorial improvement.
04.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1; • Change the reference number from *F-CDM-MR* to *CDM-MR-FORM*; • Editorial improvement.
03.2	5 November 2013	Editorial revision to correct table in page 1.
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	28 May 2010	EB 54, Annex 34. Initial adoption.

Decision Class: Regulatory
Document Type: Form
Business Function: Issuance
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