MONITORING REPORT

JI0105 - CMM utilisation on the Joint Stock Company "Coal Company Krasnoarmeyskaya Zapadnaya № 1 Mine"

Monitoring Report 03
Monitoring period
01/03/2011 to 31/10/2011

Version 3
25 November 2011

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Annexes

SECTION A. General project activity information

A.1 Title of the project activity:

CMM utilisation on the Joint Stock Company “Coal Company Krasnoarmeyskaya-Zapadnaya № 1 Mine”

Party involved (*) ((host) indicates a host Party)	Legal entity project participant (as applicable)	Please indicate if the Party involved wishes to be considered as project participant (Yes/No)
Ukraine (host)	«Colliery Group «Pokrovs’ke»[1]	no
Netherlands	Carbon-TF B.V.	no

A.2. JI registration number:

UA2000016 / JI0105
The project is approved as JI-project since 09/11/2009.
(http://ji.unfccc.int/JI_Projects/DeterAndVerif/Verification/FinDet.html)

Details of the project approval can be found under Annex I of this Monitoring Report.

A.3. Short description of the project activity:

In this project CMM, which has been sucked out of the active coal mine «Colliery Group «Pokrovs’ke», has been utilised in a previous coal boiler, which has been upgraded with a CMM burning system and a flare. The methane has been burned to less harmful CO_2.

The construction of the cogeneration station at the central shaft has started already in 2008 but remained unfinished until the end of the monitoring period. Initial operation is expected in October 2011[2].

The installation of a new vacuum pump station was delayed and has been finished at the air-Shaft. Even if this vacuum pump station is outside the project boundary, it is required for the planned cogeneration unit station.

In this monitoring the gained emission reductions should be monitored for the purpose of the verification as Emission Reductions Units (ERU).

Table-1 Amount of methane utilised for heat generation and flaring

period	CH_4 [m³/period]	Heat generated [MWh]
01/03/2011-31/10/2011	10,440,977	22,446

A.4. Monitoring period:

[1] The name of the coal mine changed to «Colliery Group «Pokrovs’ke», see B.4. for justification

[2] The date of the initial operation of cogeneration station was postponed in comparison with previous monitoring report because of delays during equipment adjustment

Start date 01/03/2011

End date 31/10/2011

Start day and end day included.

A.5. Methodology applied to the project activity (incl. version number):

A.5.1. Baseline methodology:

The approved consolidated methodology ACM0008 / Version 03 "Consolidated baseline methodology for coal bed methane and coal mine methane capture and use for power (electrical or motive) and heat and/or destruction by flaring") has been used to identify the baseline scenario of the proposed JI project [ACM0008].

According to ACM0008 the methodological “Tool to determine project emissions from flaring gases containing methane”, EB 28 Meeting report, Annex 13, has been taken for the determination of the project emissions from flaring. In difference to the flaring tool a combustion efficiency of 99.5%, according to the IPCC guidelines (see also ACM0008 Version 1 and Version 2), has been taken into account instead of the default value of 90% as given in the flaring tool.

A.5.2. Monitoring methodology:

A monitoring plan provided by the “Approved consolidated baseline methodology ACM0008”, Version 03, Sectoral Scope: 8 and 10, EB28 is applied to the project [ACM0008].

Applicability requirements for the monitoring plan of the ACM008 methodology are identical to respective requirements of the baseline setting.

According to ACM0008 the methodological “Tool to determine project emissions from flaring gases containing methane”, EB 28 Meeting report, Annex 13, has been taken for the determination of the project emissions from flaring. In difference to the flaring tool a combustion efficiency of 99.5%, according to the IPCC guidelines (see also ACM0008 Version 1 and Version 2), has been taken into account instead of the default value of 90% as given in the flaring tool.

A.6. Status of implementation including time table for major project parts:

The project has not been installed as planned in the PDD. In the monitoring period only one upgraded boiler and one flare were working. The installation of further units as stated in the PDD is delayed due to the Global Financial Crisis and should follow in the end of 2011. See Table-3 for details.

The coordinates given in the PDD uses the SK-42 reference system which uses a slightly different reference ellipsoid than the WGS84 (World Geodetic System) system used by Google. The SK-42 system and the substantial cartography are still in use in the most CIS countries and Ukraine too.

The WGS84 coordinates are:

Central Shaft: 48°15’31’’ N, 36°59’30’’ E
Air Shaft: 48°15’20’’ N, 37°01’57’’ E

Table-2 Status of Implementation

Unit: upgraded previously coal fired steam boiler at central shaft	
Manufacturer: Biysk Boiler Plant	
Type: KE-25-14KC	
Serial Number: 6827 (not visible)	
Inventar Number: 4022 (visible)	
Capacity: 25 t/h steam (approx. 25 MW)	
Activity	**Status**
year of construction	06/05/1986
last major overhaul	22/12/2002 - Ukrteploservis
Last inspection	15/03/2011 - Derzhgorpromnadzor
Commission of upgrade	20/03/2003
Official completion of upgrade	31/03/2003
Start of initial operation, first tests	summer 2003
Start of operation	October 2003
Planned installation date [PDD]	October 2003

Unit: Flare 1	
Manufacturer: Hofstetter Umwelttechnik AG	
Type: HOFGAS®-IFL4c 9000	
Serial Number:H 10244	
Capacity: max. 9,000 m³/h gas (20-40% CH_4), max 25 MW firing capacity	
Activity	**Status**
Year of construction	2008
Last inspection	2010, Sinapse
Commission date	21/03/2008
Start of operation	October 2010
Planned installation date [PDD]	January 2008

Table-3 Installation plan [PDD] –original and updated timeline

unit	**installation date (PDD)**	**firing capacity**	**planned installation new timetable**
Central Shaft			
upgraded boiler	Oct 2003	25 MW	October 2003
flare No: 1	Jan 2008	5 MW	1 Flare with 25 MW in October 2010
flare No: 3	Mar 2008	5 MW	Included above
cogeneration units	Jul 2008	total of 48.8 MW	October 2011
Degassing wells			
flare/pump No: 2	Jan 2008	5 MW	Late 2011 or early 2012
flare/pump No: 7	Apr 2008	5 MW	Late 2011 or early 2012

Air Shaft № 2			
flares No: 4-6	Apr 2008	total of 15 MW	Late 2011 or early 2012
cogeneration units	Jun-Oct 2008	total of 67.5 MW	Late 2011 or early 2012
cogeneration units	Jan 2009	total of 30 MW	Late 2011 or early 2012

A.7. Intended adjustments or revisions to the registered PDD:

In the PDD the start of operation of the boiler in October 2003 is given instead of the installation date. See Table-2 in A.6 for details. The installation of numerous units is delayed as stated under A.6. Instead of two flares with a capacity of 5 MW one flare with a capacity up to 25 MW has been installed at the central shaft.

A.8. Intended adjustments or revisions to the registered monitoring plan:

A revised monitoring plan has been provided. See <Revised Monitoring Plan-KAZ1.pdf>

The calculation of the emission reductions is not calculated on a yearly basis, but for an individual period. Flow data and flare efficiency as well as the methane amount destroyed by flaring MD_{Fl} are calculated in 15 min. intervals in Excel sheets. The main emissions variables for project emissions, baseline emissions and emissions reductions are calculated on a monthly basis. Yearly sums and a total sum for the monitoring are calculated.
The formula for the calculation of project emissions from uncombusted methane has been updated. Formulae from the «Methodological “Tool to determine project emissions from flaring gases containing methane”» [AM_Tool_07]) have been applied, see Annex 4. The calculation of project emissions from uncombusted methane from flaring is now more accurate.

A.9. Changes since last verification:

The installation of the flare has been completed, the flare started operation at 26/10/2010. The installation of the cogeneration units is still in progress, and remained unfinished until the end of the monitoring period.

A.10. Person(s) responsible for the preparation and submission of the monitoring report:

«Colliery Group «Pokrovs’ke»[3]
- Volodymyr Tymchenko, Technical Director since February 2010

Carbon-TF B.V
- Dr. Jürgen Meyer, Managing Director
- Clemens Backhaus, Managing Director

Eco-Alliance OOO
- Vladimir Kasyanov, Managing director
- Pavel Shelegeda, Deputy Director
- Aleksandr Didenko, Monitoring Assistant
- Viktor Avtonomov, Monitoring Assistant

[3] The name of the coal mine changed to «Colliery Group «Pokrovs’ke», see B.4. for justification

SECTION B. Key monitoring activities according to the monitoring plan for the monitoring period stated in A.4.

B.1. Monitoring equipment:

B.1.2. Table providing information on the equipment used (incl. manufacturer, type, serial number, date of installation, date of last calibration, information to specific uncertainty, need for changes and replacements):

Table-4 Monitoring equipment

ID	Data	Method	Manufacturer	Classification	Serial number	Frequency of mea-surement	Instal-lation	Range	Uncertainty level of data	Calibration procedure	Last calibration	Calibrator
2a	CH_4 concentration	Infrared measurement	POLITRON - Draeger	Gas analyser	ARSK 0191	measurement continuous record period 15 min.	2002	0-100 %	4% absolute error in the range below 40% LEL**) 10% relative error in the range above 40% LEL**)	Yearly calibration made using procedures of Sumystandart-metrology. Calibrations made using procedures of Eco Alliance every 2 weeks.	28/12/2010	Sumystandart -metrology
3	NMHC concentration	lab analysis	Chromatograp h	3700 L	279	yearly	unknown	$1\text{-}5*10^{-4}$%	10% for upper range limit 25% for lower range limit	The approved laboratory is responsible for regular recalibrations of the system.	unknown	Donetskstand art-metrology
4	CMM amount to boiler	Vortex flow meter	"Sibnefteavto matika" IJSC, Tyumen, Russia	DRG.MZ-300	06136	measurement continuous record period 15 min.	Sep 2009	562.5-22,500 m³/h	1.5% in the range: 0.1 V_{max} to 0.9 V_{max}*)	Calibration made using procedures of the manufacturer. Calibration frequency – 3 years	30/04/2009	Manufacturer

ID	Data	Method	Manufacturer	Classification	Serial number	Frequency of mea-surement	Instal-lation	Range	Uncertainty level of data	Calibration procedure	Last calibration	Calibrator
5	CMM pressure (boiler)	Ceramic pressure pick-up	Siemens	SITRANS P Serie Z	AZB/W 5132862	measurement continuous record period 15 min.	Sep 2009	0-1.6 bar, abs	0.5%)	Calibration made using procedures of the manufacturer. Calibration frequency – 1 year	25/01/2011 certificate № 0077	Sumystandart -metrology
6	CMM temperature (boiler)	Resistance thermometer	JSC "Tera", Chernigov	TSPU 1-3N Pt-100 0.5% 80F8	09124	measurement continuous record period 15 min.	Sep 2009	-50-250°C	0.5%	Calibration made using procedures of the manufacturer. Calibration frequency – 1 year	25/01/2011 passport to Resistance thermometer № 09124	Sumystandart -metrology
7	Steam amount to boiler	Vortex flow meter	"Sibnefteavto matika" IJSC, Tyumen, Russia	DRG.MZ-200	06135	measurement continuous record period 15 min.	Sep 2009	250-10,000 m³/h	1.5% in the range: 0.1 V_{max} to 0.9 V_{max}*)	Calibration made using procedures of the manufacturer. Calibration frequency – 3 years	30/04/2009	Manufacturer
8	Steam pressure (boiler)	Ceramic pressure pick-up	Siemens	SITRANS P Serie Z	AZB/A2199938	measurement continuous record period 15 min.	Jan. 2011	0-10 bar, abs	0.5%	Calibration made using procedures of the manufacturer. Calibration frequency – 1 year	By manufac-turer	Manufacturer
9	Steam Temperature (boiler)	Resistance thermometer	JSC "Tera", Chernigov	TSPU 1-3N Pt-100 0,5% 80F8	09436	measurement continuous record period 15 min.	Oct. 2010	-50-250°C	0.5%	Calibration made using procedures of the manufacturer. Calibration frequency – 1 year	07/10/2011	Sumystandart -metrology
10	CMM amount to flare	flow calculation unit	"Sibnefteavto-matika" IJSC, Tyumen, Russia	BVR M	10512 until 16/08/2011 14033 from 19/08/2011	measurement continuous record period 15 min.	Oct. 2010 Aug. 2011	n.a	1.5% in the range: 0.1 V_{max} to 0.9 V_{max}*)	Calibration made using procedures of the manufac-turer. Calibration frequency – 3years	For unit 10512: 20/07/2010 By manufac-turer For unit

ID	Data	Method	Manufacturer	Classification	Serial number	Frequency of mea-surement	Instal-lation	Range	Uncertainty level of data	Calibration procedure	Last calibration	Calibrator
											14033: 26/04/2011 By manufac-turer	
11	CMM amount to flare	Gas flow transmitter	"Sibnefteavto-matika" IJSC, Tyumen, Russia	DRG MZL 200-400	10144	measurement continuous record period 15 min.	Oct. 2010	2,000-40,000 m³/h	1.5% in the range: 0.1 V_{max} to 0.9 V_{max}*)	Calibration made using procedures of the manufacturer. Calibration frequency – 3 years	20/07/2010 By manufac-turer	Manufacturer
12	CMM pressure (flare)	Pressure transmitter	Metran	Metran 150TG2	932847	measurement continuous record period 15 min.	Oct. 2010	0... 60 kPa	0.25%	Calibration made using procedures of the manufacturer. Calibration frequency – 4 years	05/08/2010 By manufac-turer	Manufacturer
13	CMM pressure (flare)	Measuring Transformer	Microterm until 16/08/2011 VEGA Grieshaber KG from 19/08/2011	MTM700DI-Ex until 16/08/2011 Vegabar 17 from 19/08/2011	1595 until 16/08/2011 20108320 from 19/08/2011	measurement continuous record period 15 min.	Oct. 2010 Aug. 2011	0÷0,1 MPa	0,25%	Calibration made using procedures of the manufacturer. Calibration frequency – 1 year	For unit 1595: 14/07/2010 By manufacture r For unit 20108320: 13/04/2011 By manufacture r	Manufacturer
14	CMM Temperature	Measuring Transformer	Microterm	MTM201D	3401	measurement continuous record period 15 min.	Oct. 2010	-50 - 100°C	0.25 %	Calibration made using procedures of the manufacturer. Calibration frequency – 1 year	31/10/2011	Donetskstand-artmetrology

ID	Data	Method	Manufacturer	Classification	Serial number	Frequency of mea-surement	Instal-lation	Range	Uncertainty level of data	Calibration procedure	Last calibration	Calibrator
15	CH_4 Concentration	Infrared measurement	NUK	NGA5 CH_4/O_2	11034	measurement continuous record period 15 min.	Oct. 2010	0...100% CH_4 0...25% O_2	2 %	Calibration made using procedures of the manufacturer. Calibration frequency – 1 year	28/10/2011	Donetskstand-artmetrology
16	Electricity	Electricity meter	Actaris	SL7000 Type – SL761E071	53024005	Continuous, cumulative value Read period monthly	Oct. 2010	n.a	0.5%	Initial calibration made by manufacturer using procedures according to IEC61036. Calibration is spent 1 time in 6 years	By manufacture r	Manufacturer
17	Flare Temperature	Thermo couple	RPE "ELEMER" until 02/06/2011 Energoterm	THAU-205 until 02/06/2011 TPP-401M	7459 until 02/06/2011 258-11 until 19/08/2011 436-11	measurement continuous record period 15 min.	Oct. 2010 Jun. 2011 Aug. 2011	0… 1300°C	1.5%	none, thermocouple is supposed to be changed at least one time per year, according to the flaring tool	changed every year	none

Note: Changes during third monitoring period

Vortex flow meter was removed as it represented two measuring units which also are described in the Table: flow calculation unit BVR M and gas flow transmitter DRG MZ 200-400. Also resistance thermometer TSM-1088 was removed because it represented the unit for measuring CMM temperature together with measuring transformer MTM201D, so it was decided to leave only MTM201D. Electricity meter Actaris was added.

The calibrations for Measuring Transformer MTM 201D and Gas analyzer NGA5 were made due to the date of the initial operation of the Flare and not the date of manufacturer's calibration.

*) The velocities are always in the specified range. The velocities correspond to the following gas flows:
ID 4 CMM flow: Q_{min} = 562.5 m³/h, Q_{max} = 22,500 m³/h
ID 7 steam flow: Q_{min} = 250.0 m³/h, Q_{max} = 10,000 m³/h
ID 10 CMM flow Q_{min} = 1,000 m³/h, Q_{max} = 40,000 m³/h

**) The Draeger Politron is mainly a CH_4 detection and warning system, which is normally utilised for the determination of dangerous methane concentrations up to the lower explosion limit LEL, for the avoidance of explosions. The analyser is designed and optimized for the exact determination of low methane concentrations. Despite that the range of the meter can be extended to the range of 0-100% CH_4 according to the Draeger manual.

The conversion of the errors from LEL to % CH_4 in the gas mixture gives the following values:

Table-5 Uncertainty levels of the Draeger Politron

Range	Range	Uncertainty	Uncertainty
< 40% LEL	< 2% CH_4	4% absolute of LEL	0.2 % CH_4 absolute
> 40% LEL	> 2% CH_4	10% relative	Linear error increase starting with 0.2 % CH_4 abs at 2% CH_4 concentration Ending with 10% CH_4 abs at 100% CH_4

B.2. Data collection (accumulated data for the whole monitoring period):

B.2.1. List of fixed default values:

Table-6 List of ex-ante fixed values, struck through symbols are not used in this MR

ID number	Data variable	Source of data	Data unit	Comment
P13 Eff_{FL}	Flare combustion efficiency	revised monitoring plan	%	Set to: 99.5 % for $T_{flare} > 1000°C$ 90.0 % for $500°C < T_{flare} < 1000°C$ 0.0 % for $T_{flare} < 500°C$
~~P16 Eff_{ELEC}~~	~~Efficiency of methane destruction / oxidation in power plant~~	~~IPCC~~	~~%~~	~~set at 99.5% (IPCC)~~
P19 Eff_{HEAT}	Efficiency of methane destruction / oxidation in heat plant	ACM0008 / IPCC	%	set at 99.5% (IPCC)
P23, B19 CEF_{CH4}	Carbon emission factor for combusted methane	ACM0008 / IPCC	t CO_2eq/t CH_4	set at 2.75 t CO_2eq/t CH_4
P28, B18 GWP_{CH4}	Global warming potential of methane	ACM0008 / IPCC	t CO_2eq/t CH_4	set at 21
~~B49 EF_{ELEC}~~	~~CO_2 emission factor of the grid~~	~~data calculated and published by SenterNovem [SenterNovem]~~	~~t CO_2 / MWh~~	~~Should a new officially approved standardised baseline for Ukraine be adopted, the baseline carbon emission factor will be changed accordingly.~~
B55 EF_{HEAT}	CO_2 emission factor of fuel used for captive power or heat	IPCC 2006 1 Introduction Table 1.2	tCO_2/MWh	set to 0.3406 tCO_2/MWh Using the value for “Other Bituminous Coal” of 94,600 kg CO_2/TJ
B57 Eff_{COAL}	Energy efficiency of coal fired heat plant	Boiler pass	%	set to 73.5% (RMP)

B.2.2. List of variables:

Table-7 List of variables, struck through symbols are not used in this MR

ID number	Data variable	Source of data	Data unit	Comment
P1 PE	Project emissions	monitored data	tCO_{2eq}	calculated using formulae from the revised monitoring plan
~~P2 PE_{ME}~~	~~Project emissions from energy use to capture and use methane~~	~~monitored data~~	~~tCO_{2eq}~~	~~calculated using formulae from the revised monitoring plan~~
P3 PE_{MD}	Project emissions from methane destroyed	monitored data	tCO_{2eq}	calculated using formulae from the revised monitoring plan

P4 PE_{UM}	Project emissions from uncombusted methane	monitored data	t CO_{2eq}	calculated using formulae from the revised monitoring plan
~~P5~~ ~~$CONS_{ELEC,PJ}$~~	~~Additional electricity consumption by project~~	~~electricity meter~~	~~MWh~~	
~~P8~~ ~~$CEF_{ELEC,PJ}$~~	~~Carbon emission factor of $CONS_{ELEC,PJ}$~~	~~data calculated and published by SenterNovem [SenterNovem]~~		~~Should a new officially approved standardised baseline for Ukraine be adopted, the baseline carbon emission factor will be changed accordingly.~~
P9 PE_{Flare}	Project emissions from flaring	monitored data	t CO_{2eq}	calculated using formulae from the revised monitoring plan
P11 MD_{FL}	Methane destroyed by flaring	calculated	t CH_4	calculated using formulae from the revised monitoring plan
P12 MM_{FL}	Methane sent to flare	measured ID's- 10-13	t CH_4	
~~P14~~ ~~MD_{ELEC}~~	~~Methane destroyed by power generation~~	~~monitored data~~	~~t CH_4~~	calculated using formulae from the revised monitoring plan
~~P15~~ ~~MM_{ELEC}~~	~~Methane sent to power generation~~	~~monitored data~~	~~t CH_4~~	calculated using formulae from the revised monitoring plan
P17 MD_{HEAT}	Methane destroyed by heat generation	monitored data	t CH_4	calculated using formulae from the revised monitoring plan
P18 MM_{HEAT}	Methane sent to boiler	flow meter	t CH_4	calculated using formulae from the revised monitoring plan
P24 CEF_{NMHC}	Carbon emission factor for combusted non methane hydrocarbons (various)	lab analysis	t CO_2 / t NMHC	calculated if applicable
P25 PC_{CH4}	Concentration of methane in extracted gas	IR measurement	%	
P26 PC_{NMHC}	NMHC concentration in coal mine gas	lab analysis	%	used to check if more than 1% of emissions and to calculate r
P27 r	Relative proportion of NMHC compared to methane	lab analysis	%	calculated if applicable, based on the lab analysis.
B1 BE	Baseline emissions	monitored data	t CO_{2eq}	calculated using formulae from the revised monitoring plan
B3 BE_{MR}	Baseline emissions from release of methane into the atmosphere that is avoided by the project activity	monitored data	t CO_{2eq}	calculated using formulae from the revised monitoring plan

B4 BE_{Use}	Baseline emissions from the production of power, heat or supply to gas grid replaced by the project activity	monitored data	t CO_{2eq}	calculated using formulae from the revised monitoring plan
B14 CMM_{PJ}	CMM captured by the project activity	flow meters	t CH_4	
~~B46 GEN~~	~~Heat generation by project~~	~~heat meter~~	~~MWh~~	~~Cumulative value~~
B47 HEAT	Heat generation by project	heat meter	MWh	measured using steam flow data
T_{Flame}	Flame temperature of the flare	temperature meter	[°C]	

B.2.3. Data concerning GHG emissions by sources of the project activity

Table-8 GHG emissions by sources of the project activity, struck through symbols are not used in this MR

ID number	Data variable	Source of data	Data unit	Comment
~~P5 $CONS_{ELEC,PJ}$~~	~~Additional electricity consumption by project~~	~~electricity meter~~	~~MWh~~	
P12 MM_{FL}	Methane sent to flare	measured ID's- 10-13	t CH_4	
~~P15 MM_{ELEC}~~	~~Methane sent to power generation~~	~~monitored data~~	~~t CH_4~~	calculated using formulae from the revised monitoring plan
P18 MM_{HEAT}	Methane sent to boiler	flow meters	t CH_4	
P25 PC_{CH4}	Concentration of methane in extracted gas	IR measurement	%	
P26 PC_{NMHC}	NMHC concentration in coal mine gas	lab analysis	%	used to check if more than 1% of emissions and to calculate r

B.2.4. Data concerning GHG emissions by sources of the baseline

Table-9 GHG emissions by sources of the baseline, struck through symbols are not used in this MR

ID number	Data variable	Source of data	Data unit	Comment
B14 CMM_{PJ}	CMM captured by the project activity	flow meter	t CH_4	
~~B46 GEN~~	~~Heat generation by project~~	~~heat meter~~	~~MWh~~	~~Cumulative value~~
B47 HEAT	Heat generation by project	heat meter	MWh	measured using steam flow data

B.2.5. Data concerning leakage

Not applicable.

B.2.6. Data concerning environmental impacts

The project meets all the ecological requirements and all ecological permissions are present for equipment used in the project. In general all the activities which were performed from the beginning of the project led to the significant reduction of the methane emissions into the atmosphere and now almost all of CMM is utilized at the Central Shaft.

B.3. Data processing and archiving (incl. software used):

The data for the boiler are collected, processed and stored using a Siemens SIMATIC PLC S7 system and Siemens WINCC programming software. All data is stored in the internal memory about 2 GB. One time per hour the data are sent via GPS to an Internet-based Server data base. Eco-Alliance ensures regular backups and archiving. Further on the data is stored and archived by Eco-Alliance.
The data can be read any time from the internet data base by authorised personnel. The utilised methane amount is automatically calculated and stored in the PLC. As all input data are stored, the automatically calculation can by checked in retrospect any time.

For the flare and the cogeneration units Sinapse has provided a system for data collecting, archiving and sending to Internet, called Graphic Data Manager RSG 40 Memograph M. The data is stored in the memory of computer for 6 months. Every month coal mine personnel save the data into flash memory and send it to Eco-Alliance.

For plausibility checks and potential data back up the data logged in the hand written journals of the suction system can be taken.

B.4. Special event log:

On 16/08/2011 there was a lightning stroke at the central shaft Colliery Group «Pokrovs'ke». This accident has caused shutdown of Flare and 2 days downtime with incapacitation of flow meter BVR M and pressure transformer MTM700DI-Ex. During this period the flare didn't work and there is no electronic or handwritten data available so the emission reductions for the flare were not calculated for this period. The broken-down equipment was changed.

SECTION C. Quality assurance and quality control measures

C.1. Documented procedures and management plan:

C.1.1. Roles and responsibilities:

The general project management is implemented by the Technical Director of the «Colliery Group «Pokrovs'ke» through supervising and coordinating activities of his subordinates, such as the degasification engineer, heating technician, and safety engineering departments.
Daily a group of mechanics and electricians who are responsible for the measures and maintenance of all technological equipment and measuring instruments are present on-site. There are two shifts, 12 h each. For every shift there is one person on-duty responsible for the proper operation and keeping of the journals.
The general supervision of the monitoring system is executed by the administration of the coal mine under the existing control and reporting system.

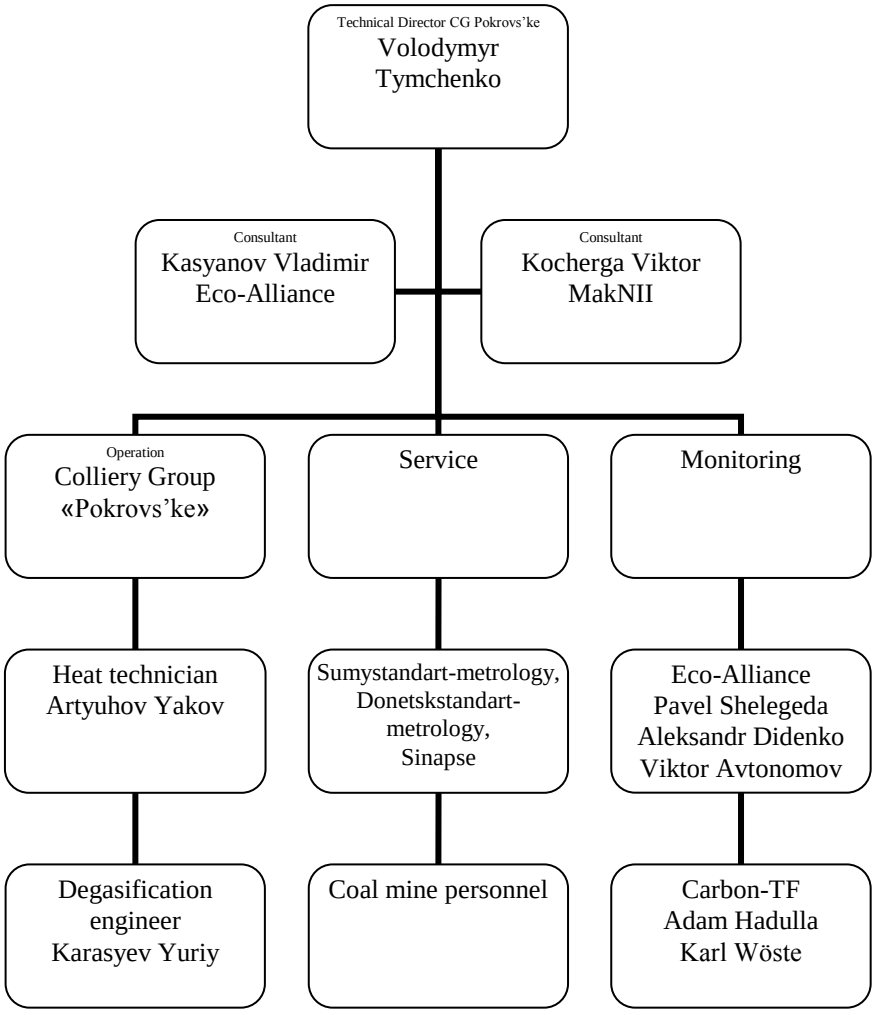

Figure 1 – Organigram

C.1.2. Trainings:

The employees of the boilerhouse responsible for the monitoring control have been trained on–the–job during the installation of the system. The responsible personnel of Eco-Alliance have been trained on the handling with CMM-utilisation units and the applied monitoring systems, during several practical courses in Germany. In this courses which has been carried out by A-TEC Anlagentechnik GmbH, a Joint-Venture participant of Eco-Alliance, also the basic principles of emissions trading and the background of the monitoring has been explained.
A-TEC Anlagentechnik GmbH is already running several CMM utilisation plants and monitoring systems in Germany.
These trained personnel is the basis of a team of engineers, which should establish a specialised service team in the Ukraine and instruct further operating and monitoring personnel, as well for this project.
The personnel of the flare unit responsible for monitoring control have been trained on–the–job during the installation of the flare unit and monitoring system by Sinapse.

C.2. Involvement of Third Parties:

- Sumystandartmetrolology and Donetskstandartmetrolology are subsidiaries of the “Ukrainian Ukrainian Centre for Standardisation and Metrology”, which is part of the “State Committee for Matters of Technical Regulations and Consumer Politics”, which is part of the government, were involved for the regular calibration of the measuring equipment.
- Respirator has been involved for the lab analysis (NHMHC) of the CMM in 2008, 2009, 2010 and 2011.
- Eco-Alliance provided the electronically data acquisition system and the monitoring activity together with the coal mine personnel.
- As the provider of flare equipment and flare monitoring system, Sinapse performs maintenance and adjustment of the monitoring system.

C.3. Internal audits and control measures:

Every 2 weeks a monitoring engineer from Eco-Alliance makes audits and remarks this in the operational journal. The mechanic on duty from the coal mine makes daily audits.

The monitoring engineer (Eco-Alliance) checks the data from web-site every day and makes internal weekly reports.

Methane concentration and CMM flow data of the flares are compared with the indication of the meters from the vacuum pump station for plausibility. The coal mine personnel have been instructed by Eco-Alliance.

QM procedure:

For boilerhouse:

- Electronic data are stored at Eco-Alliance and Carbon-TF.
- Back-ups are made regularly by Eco-Alliance and Carbon-TF.
- A monitoring engineer from Eco-Alliance checks the data from web-site every day and makes internal weekly reports.
- Eco Alliance prepares monthly reports which are checked by Carbon-TF B.V.
- Additionally data are recorded manually in journals by the coal mine personnel
- The journals are checked daily by the chief heat technician and cross-checked by Eco Alliance every 2 weeks. Monitoring engineer from Eco-Alliance makes a remark in the operational journal.
- The paper data are stored at the coal mine.

- The mechanic on duty from the coal mine makes daily audits.
- Eco-Alliance makes service audits every month.

For flare and planned cogeneration units:

- Electronic data are stored in the memory of Graphic Data Manager RSG 40 Memograph.
- Back-ups are made regularly by personnel of the coal mine's Cogeneration Section.
- Data are recorded manually in journals by personnel of the coal mine's Cogeneration Section.
- The journals are checked daily by the engineer of technical diagnostics and cross-checked by the programmers of the Cogeneration Section.
- The paper data are stored at the coal mine.
- Every month personnel of the Cogeneration Section sends electronic data from the flare to Eco-Alliance.

General:

- Carbon-TF prepares the monitoring report, which is checked by Eco-Alliance and the coal mine.

C.4. Troubleshooting procedures:

The general troubleshooting for the steam boiler hasn't changed. In case of disturbance the gas supply to the boiler is shut down by a quick acting valve and the CMM supplied by the degasification system of the coal mine is blown to the atmosphere. The flare is also automatically shut down in case of faults.
The procedures are available at the coal mine. The coal mine personnel are instructed to follow the procedures.

SECTION D. Calculation of GHG emission reductions

D.1. Table providing the formulas used:

Table-10 Formulae used taken from the Revised Monitoring Plan, struck through symbols are not used in this monitoring report. (these symbols are referring to project components which are not installed yet or project emissions not applicable at this time).

ID number	Data variable	Formula
P1 PE	Project emissions	$PE = \sout{PE_{ME}} + PE_{MD} + PE_{UM}$
P2 PE_{ME}	Project emissions from energy use to capture and use methane	$\sout{PE_{ME} = CONS_{ELEC,PJ} \times CEF_{ELEC,PJ}}$
P3 PE_{MD}	Project emissions from methane destroyed	$PE_{MD} = (MD_{FL} \sout{+ MD_{ELEC}} + MD_{HEAT}) \times (CEF_{CH4} + r \times CEF_{NMHC})$
P4 PE_{UM}	Project emissions from uncombusted methane	$PE_{UM} = GWP_{CH4} \times [\sout{MM_{ELEC} \times (1 - Eff_{ELEC}) + MM_{HEAT} \times (1 - Eff_{HEAT})}] + PE_{Flare}$
P11 MD_{FL}	Methane destroyed by flaring	$MD_{FL} = \sum_{i=1}^{n} MM_{FL,i} \times \eta_{flare,i}$
\~~P14~~ \~~MD_{ELEC}~~	\~~Methane destroyed by power generation~~	$\sout{MD_{ELEC} = MM_{ELEC} \times Eff_{ELEC}}$
P17 MD_{HEAT}	Methane destroyed by heat generation	$MD_{HEAT} = MM_{HEAT} \times Eff_{HEAT}$
PE_{Flare}	Project emissions from flaring	$PE_{Flare} = (MM_{Fl} - MD_{Fl}) \times GWP_{CH4}$
P27 r	Relative proportion of NMHC compared to methane	$r = PC_{NMHC} / PC_{CH4}$
B1 BE	Baseline emissions	$BE = BE_{MR} + BE_{Use}$
B3 BE_{MR}	Baseline emissions from release of methane into the atmosphere that is avoided by the project activity	$BE_{MR} = CMM_{PJ} \times GWP_{CH4}$
B4 BE_{Use}	Baseline emissions from the production of power, heat or supply to gas grid replaced by the project activity	$BE_{Use} = \sout{GEN * EF_{ELEC}} + (HEAT / Eff_{COAL}) * EF_{HEAT}$
B14 CMM_{PJ}	CMM captured in the project activity	$CMM_{PJ} = (MM_{FL} + \sout{MM_{ELEC}} + MM_{HEAT})$
ER	Emission reductions	$ER = BE - PE$

D.2. Description and consideration of measurement uncertainties and error propagation:

Some minor errors which have been identified in hand written operation journals have been corrected. Mistakes were made during the writing the data from the monitor into journals.

D.3. GHG emission reductions (referring to B.2. of this document):

D.3.1. Comparison

Period	**Prospected emission reductions, PDD [t CO_{2eq}]**		**Monitored emission reductions [t CO_{2eq}]**	
	Full year	Proportionally for the monitoring period	In tonnes CO_2eq and percentage of the prospected emission reductions	
01/03/2011-31/10/2011	1,787,002 (2011)	1,191,335	144,470	12,1%

The monitored values are significantly lower than the prospected values, because a big part of the project has not been installed until the end of the monitoring period.

D.3.2 Monitored project emissions

Monitored project emissions [t CO_2eq / a]	
period	01/03/2011-31/10/2011
methane destruction	
flaring	12,580
heat generation	10,562
power generation	0
additional power consumption	
power generation	0
Total	**23,142**

D.3.3 Monitored baseline emissions

Monitored baseline emissions [t CO_2eq / a]	
period	01/03/2011-31/10/2011
release of methane that is avoided by the project	
flaring	79,149
heat generation	78,061
power generation	0
production of heat that is displaced by the project	10,402
production of power that is displaced by the project	0
Total	**167,612**

D.3.4 Project emissions, baseline emissions and emission reductions

Year	Monitored project emissions (tonnes of CO_2 equivalent)	Monitored leakage (tonnes of CO_2 equivalent	Monitored baseline emissions (tonnes of CO_2 equivalent)	Monitored emissions reductions (tonnes of CO_2 equivalent)
01/03/2011-31/10/2011	23,142	-	167,612	144,470
Total (tonnes of CO_2 equivalent)	23,142	-	167,612	144,470

The total GHG emission reduction for the monitoring period 01/03/2011-31/10/2011 is 144 470 t CO2eq.

This monitoring report has been prepared by Eco-Alliance
Responsible person: Avtonomov Viktor

Kyiv, 25/11/2011

Annex 1

REFERENCES

- Project Design Document; Version 04, dated 2008-09-10
- Final Determination Report for the project: JI0105 “CMM utilisation on the Joint Stock Company “Coal Company Krasnoarmeyskaya Zapadnaya № 1 Mine””; Report No: 2008-1279 Rev 01, by DNV Det Norske Veritas, dated 2008-08-30
- Letter of Approval, Nr. 2239/11/10-08, issued on 2008-02-22 by the Ukraine (host party)
- Letter of Approval, Nr. 2008JI02, issued on 2008-04-22 by the Kingdom of the Netherlands (investor party)
- Letter of Endorsement, Nr. 973/10/3-10, issued on 2007-02-02 by the Ukrainian Ministry of Environmental Protection
- supporting evidence documents provided by the coal mine
- revised monitoring plan, dated 2011-03-01

[AM_Tool_07] Methodological “Tool to determine project emissions from flaring gases containing methane”, EB 28, Meeting report, Annex 13 http://cdm.unfccc.int/Reference/tools/index.html

Annex 2

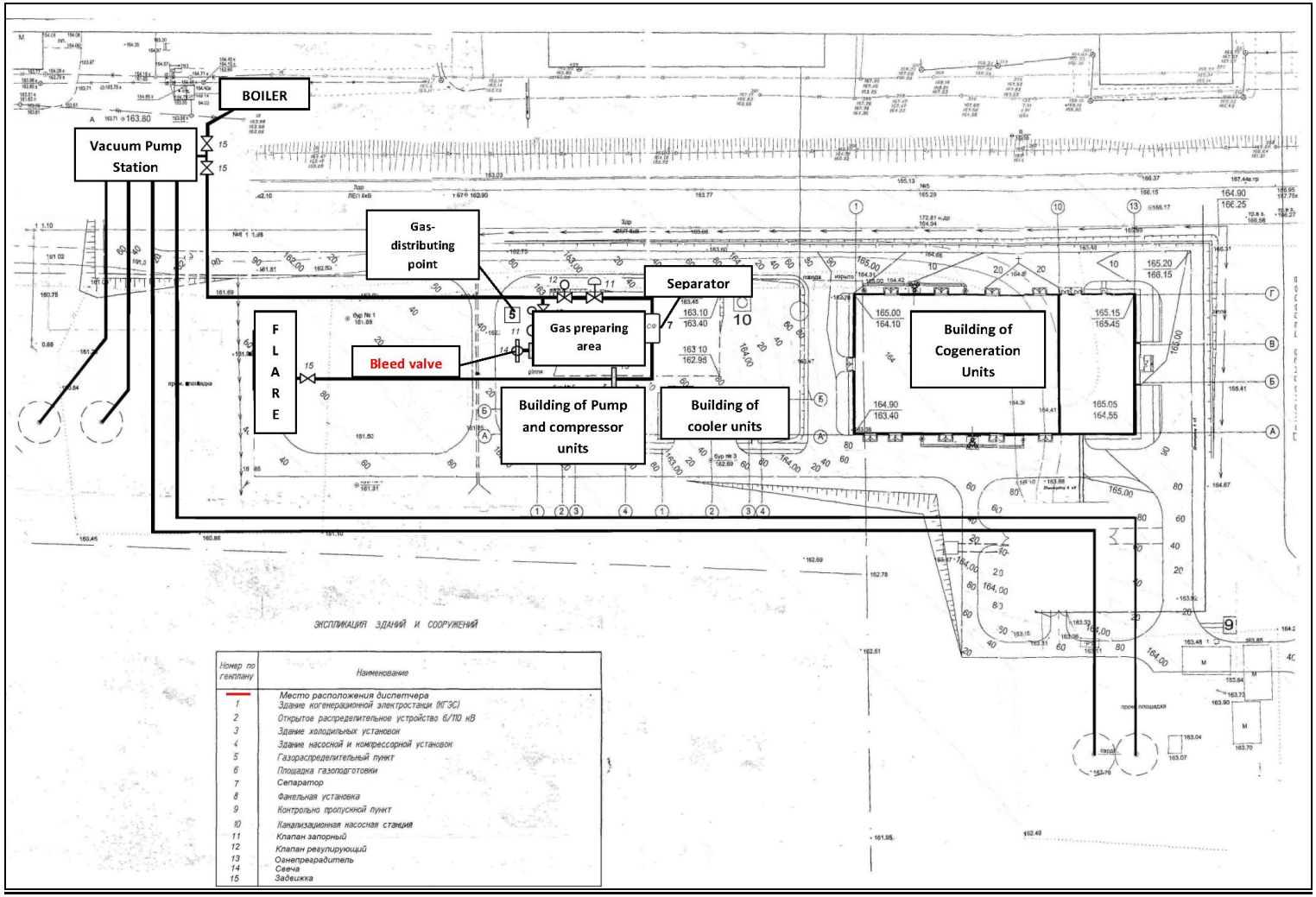

Figure-2 Location Plan – «Colliery Group «Pokrovs'ke», Central Shaft

Annex 3

Energy and material flowchart including metering positions

A3.1 Monitoring plan applied

The electronically measurement procedure, applied since 12/09/2009, is according to the monitoring plan as described in the PDD. A Vortex flow meter instead of a standard orifice as described in the PDD has been used for the measurement of the CMM amount; the flow meters are on par. Manual records (journals) are still used by the coal mine and can be taken for backup.

The CH_4 concentration is measured by a Draeger Politron meter, which is mainly a CH_4 detection and warning system, normally utilised for the determination of dangerous methane concentrations up to the lower explosion limit LEL, for the avoidance of explosions. The analyser is designed and optimized for the exact determination of low methane concentrations. Despite that the range of the meter can be extended to the range of 0-100% CH_4 according to the Draeger manual.
Since October 2010 a new gas analyser manufactured by NUK has been installed in the pipeline to the flare.
Further on a third measurement unit by “Woelke” is installed in the central suction system outside the boiler house. The plausibility measurement (Woelke-measurement unit) is not recorded.

A3.2 Measurement unit installation

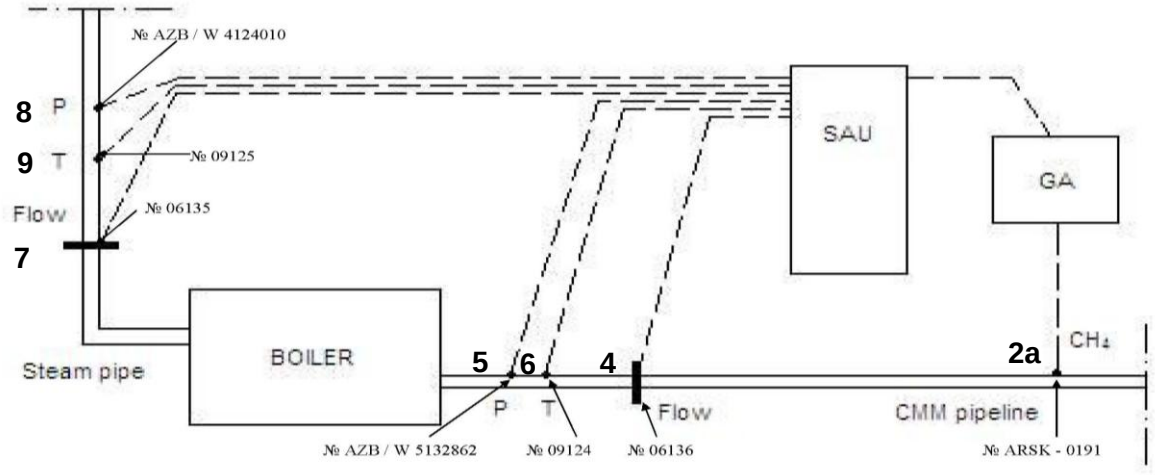

Figure-3 – Installation scheme of the boiler monitoring system
2a) concentration measurement – Draeger Politron
4) CMM flow meter - Vortex
5) CMM pressure
6) CMM temperature
7) steam flow meter - Vortex
9) steam pressure
9) steam temperature

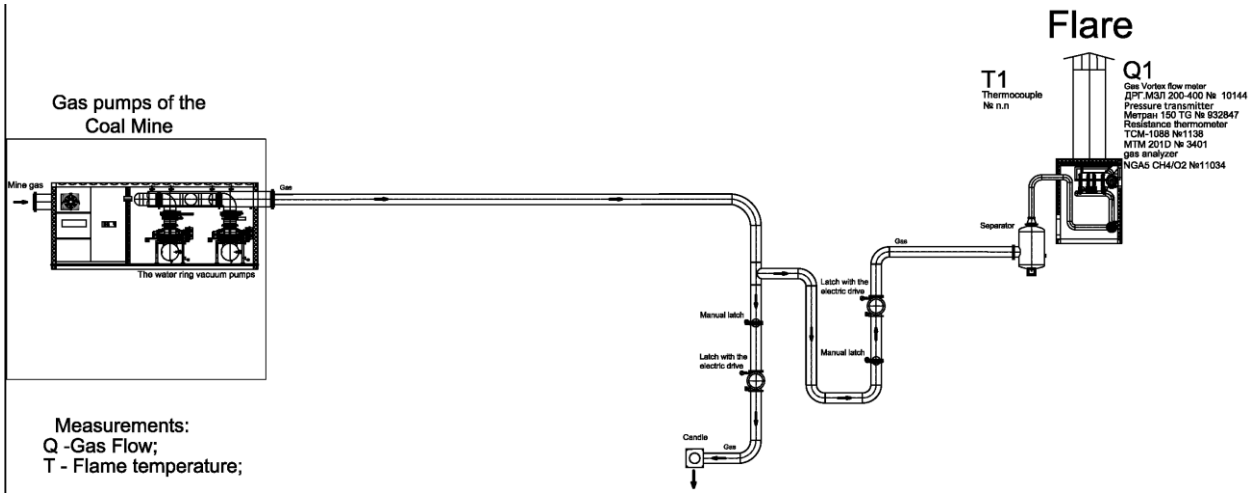

Figure-4 – Installation scheme of the flare monitoring system

Q1) CMM flow meter - Vortex
pressure transmitter – Metran 150 TG2
measuring transformer – MTM-201D
gas analyser - NGA5

T1) Thermocouple – TPP-401M

Annex 4

Deviation from the monitoring plan as stated in the PDD

A4.1 Project emissions from flaring

The formula for the calculation of project emissions from uncombusted methane has been updated. The calculation of project emissions from uncombusted methane from flaring are now more accurate.

In the PDD the formula for project emissions from uncombusted methane is given as per:

$$PE_{UM} = GWP_{CH4} \times [(MM_{FL} \times (1 - Eff_{FL}) + MM_{ELEC} \times (1 - Eff_{ELEC}) + MM_{HEAT} \times (1 - Eff_{HEAT})] \quad (9) \text{ old}$$

In the revised monitoring plan the formula (9) has been replaced by the following formula:

$$PE_{UM} = GWP_{CH4} \times [MM_{ELEC} \times (1 - Eff_{ELEC}) + MM_{HEAT} \times (1 - Eff_{HEAT})] + PE_{Flare} \quad (9) \text{ new}$$

PE_{Flare} is calculated using adopted formulae from the «Methodological "Tool to determine project emissions from flaring gases containing methane"» [AM_Tool_07] and ACM0008 Version 5. The original formulae refers to a yearly basis. The formulae have been adapted in the revised monitoring plan to variable monitoring periods:

The original formulae are:

$$PE_{Flare} = \sum_{i=1}^{n} TM_{RG,i} x (1 - \eta_{flare,i}) x \frac{GWP_{CH4}}{1000} \quad (9a)$$

where:

PE_{Flare}	Project emissions from flaring in the regarded period (t CO_2eq)
$TM_{RG,i}$	Mass flow rate of methane in the regarded interval i (kg/interval)
$\eta_{flare,i}$	flare efficiency in the interval i
GWP_{CH4}	Global warming potential of methane (21 tCO_2eq/tCH_4)
n	number of samples (intervals) in the regarded period

and

$$MD_{FL} = MM_{FL} – (PE_{Flare}/GWP_{CH4}) \quad (5)$$

where:

MD_{FL}	Methane destroyed through flaring in the regarded period (t CH_4)
MM_{FL}	Methane sent to flaring in the regarded period (t CH_4)
PE_{Flare}	Project emissions from flaring in the regarded period (t CO_2eq)
GWP_{CH4}	Global warming potential of methane (21 tCO_2eq/tCH_4)

In the revised monitoring plan and this monitoring report, formulae 9a and 5, see above have been resolved to fit better to the monitored data.

The project emissions from flaring are calculated using the equation:

$$PE_{Flare} = (MM_{Fl} - MD_{FL}) * GWP_{CH4} \quad (9a)$$

where:

PE_{Flare}	Project emissions from flaring in the regarded period (t CO_2eq)
MD_{Fl}	Methane destroyed through flaring (t CH_4)
MM_{Fl}	Methane measured sent to flaring (t CH_4)

GWP_{CH4} Global warming potential of methane (21 tCO_2eq/tCH_4)

The formula for the methane destroyed through flaring is:

$$MD_{FL} = \sum_{i=1}^{n} MM_{FL,i} x \eta_{flare,i} \quad (5)$$

where:

MD_{FL} Methane destroyed through flaring (t CH_4)

$MM_{FL,i}$ Methane sent to flaring in the interval i (t CH_4)

$\eta_{flare,i}$ Efficiency of methane destruction/oxidation in flare in the interval i, see below

n number of samples (intervals) in the regarded period

The interval is set to 15 min during the monitoring period, which is more accurate than the 1 h intervals from the «Methodological “Tool to determine project emissions from flaring gases containing methane”» [AM_Tool_07])

For $\eta_{flare,i}$ three different values are taken, depending on the current combustion temperature $T_{Flame,i}$ of the flare in the interval i:

$T_{Flame,i}$	$\eta_{flare,i}$	Source
> 1000°C*)	99.5%	revised monitoring plan Section D.1.1 and Annex 2
500-1000°C*)	90.0%	[AM_Tool_07-15]
< 500°C	0%	[AM_Tool_07-15]

*) in the original monitoring plan in the PDD a value of 850°C instead of 1000°C was given. The value has been changed according to the requirements of the manufacturer.

where:

$T_{Flame,i}$ Flame temperature of the flare in the regarded interval i (°C)

$\eta_{flare,i}$ flare efficiency in the interval i

Annex 5

Differences between the determined PDD and implemented project

There are some differences between the determined PDD and implemented project. The conditions defined by paragraph 33 of the JI guidelines are still met for the project.

- The physical location of the project has not changed.
- The emission sources have not changed.
- The baseline scenario has not changed.
- The changes are consistent with the JI specific approach and/or the clean development mechanism (CDM) methodology upon which the determination was prepared for the project.

The differences of the project installation as described in the PDD and the implemented project are listed in the table below.

unit	difference	justification
flares No: 1 & 3	delay	The installation of the flares was delayed due to lacking funds due to delayed project registration.
flares No: 1 & 3	changed number of flares, change capacity firing capacity 25 MW instead of 10 MW	In the PDD two flares with a capacity of 5 MW (total of 10 MW) each were given. The installed flare has a capacity of up to 25 MW. The bigger flare has been offered by the contractor of the CHP units – Sinapse. The coal mine decided to buy one bigger flare instead of two smaller, because of organizing and technical factors.: - design, delivery and mounting of flare unit (as of all equipment for Cogeneration Station) is made by one contractor; - compact size of the unit; - utilisation volume of the air-methane mixture of 1 unit HOFGAS exceeds in two times similar rates of two 5 MWt flares, which primarily were foreseen in PDD.
flares No: 2 & 4-7	delay	The installation of the flares is delayed due to lacking funds especially due to the Global Financial Crisis. The installation is planned for the late 2011 or early 2012.
cogeneration units at Central shaft	delay	The installation of the cogeneration units is delayed due to lacking funds especially due to the Global Financial Crisis. The installation is in progress. The initial operation is planned for October 2011.
cogeneration units at Air Shaft	delay	The installation of the cogeneration units is delayed due to lacking funds especially due to the Global Financial Crisis. The installation is planned for the late 2011 or early 2012.

The name of the Coal Mine has been changed per 07/09/2010.
The old name "Joint Stock Company "Coal Company Krasnoarmeyskaya-Zapadnaya No 1 Mine"" is no longer valid, the new name is:

"Public Joint Stock Company «Colliery Group «Pokrovs'ke»"

The identifying number and domicile of the legal entity as well as the place of registration remain unchanged.
The change of name has been reported to JISC. JISC has decided that the title of the project 105 registered in the JI Information system cannot be changed and the title of the project will keep the old name of the company.

Annex 6

History of the Document

Version	Date	Nature of Revision
1	20 October 2011	Initial adoption
2	16 November 2011	Updated version
3	25 November 2011	Revised version
4		
5		