MONITORING REPORT

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

Monitoring Report 02
Monitoring period
01/04/2010 to 28/02/2011

Version 2
08 April 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»*)	no
Netherlands	Carbon-TF B.V.	no

*) The name of the coal mine changed to «Colliery Group «Pokrovs'ke», see B.4. for justification.

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.

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]
01/04/2010-31/12/2010	6,093,397	24,397
01/01/2011-28/02/2011	3,007,937	13,162
Total 2010-2011	**9,101,333**	**37,559**

A.4. Monitoring period:

Start date 01/04/2010

End date 28/02/2011

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 upgrade 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 2010 and 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 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 WKS84 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	05/02/2008 (12/2010) – OOO Mitsar
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	November 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	04/07/2011
Degassing wells			
flare/pump No: 2	Jan 2008	5 MW	End of 2011
flare/pump No: 7	Apr 2008	5 MW	End of 2011
Air Shaft № 2			

flares No: 4-6	Apr 2008	total of 15 MW	2011
cogeneration units	Jun-Oct 2008	total of 67.5 MW	2011
cogeneration units	Jan 2009	total of 30 MW	2011

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-1 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. See A.4. for detailed data.
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»[*)]
- 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

[*)] 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**)	Calibration made using procedures of Sumystandart-metrology. .	08/10/2009 08/12/2010	Sumystandart-metrology
3	NMHC concentration	lab analysis	unknown	unknown	unknown	yearly	unknown	See <Respirator-Errors and ranges> document	See <Respirator-Errors and ranges> document	The approved laboratory is responsible for regular recalibrations of the system.	unknown	unknown
4	CMM amount to boiler	Vortex flow meter	"Sibnefteavtoma-tika" IJSC, Tyumen, Russia	DRG.MZ-300	06136	measurement continuous record period 15 min.	Sep 2009	562.5-22,500 m^3/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
5	CMM pressure	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

ID	Data	Method	Manufacturer	Classification	Serial number	Frequency of mea-surement	Instal-lation	Range	Uncertainty level of data	Calibration procedure	Last calibration	Calibrator
6	CMM temperature	PT-100	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	"Sibnefteavtoma-tika" 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	Ceramic pressure pick-up	Siemens	SITRANS P Serie Z	AZB/W 4124010 Since Jan. 2011 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	n.a	Manufacturer
9	Steam Temperature	PT-100	JSC “Tera”, Chernigov	TSPU 1-3N Pt-100 0,5% 80F8	09125 Since Oct. 2010 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	October 2010	Manufacturer
10	CMM amount to flare	Vortex flow meter	"Sibnefteavto-matika" IJSC, Tyumen, Russia	SVG MZ-400	none	measurement continuous record period 15 min.	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.	By manufac-turer	Manufacturer
11		flow calculation unit	"Sibnefteavto-matika" IJSC, Tyumen, Russia	BVR M	10512	measurement continuous record period 15 min.	2010	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 – 2 years	By manufac-turer	Manufacturer

ID	Data	Method	Manufacturer	Classification	Serial number	Frequency of mea-surement	Instal-lation	Range	Uncertainty level of data	Calibration procedure	Last calibration	Calibrator
12		Gas flow transmitter	"Sibnefteavto-matika" IJSC, Tyumen, Russia	DRG MZ 200-400	10144	measurement continuous record period 15 min.	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
13	CMM pressure	Pressure transmitter	Metran	Metran 150TG2	932847	measurement continuous record period 15 min.	2010	0... 60 kPa	0.25%	Calibration made using procedures of the manufacturer. Calibration frequency – 4 years	05/08/2010 By manufac-turer	Manufacturer
14	CMM Temperature	Resistance Thermometer	Electrotermo-metriya	TSM-1088	1138	measurement continuous record period 15 min.	2010	-50-150	0.77°C	Calibration made using procedures of the manufacturer. Calibration frequency is settled by owner.	06/2010 By manufac-turer	Manufacturer
15		Measuring Transformer	Microterm	MTM201D	3401	measurement continuous record period 15 min.	2010	-50 - 100°C	0.25 %	Calibration made using procedures of the manufacturer. Calibration frequency – 1 year	14/07/2010	Manufacturer
16	CH_4 Concentration	Infrared measure-ment	NUK	NGA5 CH_4/O_2	11034	measurement continuous record period 15 min.	2010	0...100% CH_4 0...25% O_2	2 %	Calibration made using procedures of the manufacturer.	06/07/2010 By manufac-turer	Manufacturer
17	Flare Temperature	Thermo couple	RPE "ELEMER"	THAU-205	7459...7468	measurement continuous record period 15 min.	2010	0… 1300°C	1.5%	Calibration made using procedures of the manufacturer.	By manufac-turer	Manufacturer

*) 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.1.3. Involvement of Third Parties:

- The lab analysis for the determination of the NMHC concentration has been done by Respirator in 2008, 2009 and 2010
- The calibration of the flow meter has been done by the manufacturer
- Eco-Alliance OOO supported the coal mine with the collecting of the monitoring data.
- Carbon-TF B.V. has supervised the data for plausibility and completeness.

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

ID number	Data variable	Source of data	Data unit	Comment
P13 Eff_{FL}	Flare combustion efficiency	PDD / revised monitoring plan ID-14 (T_{flare})	t CH_4	Set to: 99.5 % for T_{flare} > 850°C 90.0 % for 500°C < T_{flare} < 850°C 0.0 % for T_{flare} < 500°C
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
B55 $EF_{CO2,Coal}$	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 Ef_{HEAT}	Energy efficiency of heat plant	Boiler pass	%	set to 91% (PDD)

B.2.2. List of variables:

Table-7 List of variables

ID number	Data variable	Source of data	Data unit	Comment
P1 PE	Project emissions	monitored data	tCO_{2eq}	calculated using formulae from the PDD
P3 PE_{MD}	Project emissions from methane destroyed	monitored data	tCO_{2eq}	calculated using formulae from the PDD
P4 PE_{UM}	Project emissions from uncombusted methane	monitored data	tCO_{2eq}	calculated using formulae from the PDD
P11 MD_{FL}	Methane destroyed by flaring	calculated	t CH_4	calculated using formulae from the PDD
P12 MM_{FL}	Methane sent to flare	measured ID's- 10-13	t CH_4	
P17 MD_{HEAT}	Methane destroyed by heat generation	monitored data	t CH_4	calculated using formulae from the PDD
P18 MM_{HEAT}	Methane sent to boiler	flow meter	t CH_4	calculated using formulae from the PDD
P24 CEF_{NMHC}	Carbon emission factor for combusted non methane hydrocarbons (various)	lab analysis	-	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 PDD
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 PDD
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 PDD
B14 CMM_{PJ}	CMM captured and destroyed by the project activity	flow meters	t CH_4	
B47 HEAT	Heat generation by project	heat meter	MWh	measured using steam flow data

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

Table-8 GHG emissions by sources of the project activity

ID number	Data variable	Source of data	Data unit	Comment
P12 MM_{FL}	Methane sent to flare	measured ID's- 10-13	t CH_4	
P18 MM_{HEAT}	Methane sent to boiler	flow meters	t CH_4	
P25 PC_{CH4}	Concentration of methane in extracted gas	IR measurement	%	

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

Table-9 GHG emissions by sources of the baseline

ID number	Data variable	Source of data	Data unit	Comment
B14 CMM_{PJ}	CMM captured and destroyed in the project activity	flow meter	t CH_4	
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

Not applicable.

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 back ups and archiving. Further on the data is stored and archived by Eco-Alliance OOO.
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.
The data for the flare are collected, processed and stored using electronic system and programming software PC Server. All data is stored in the internal memory and send to an Internet-based server. Mine personnel ensures backups and archiving. The data can be read anytime from the Internet data base.

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 server data are send every 15 minutes to the server. The data is stored in the memory of computer for 6 months. Every month coal mine personnel save the data into flash memory.
future.

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:

1) 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.

2) There have been some periods where low utilisation took place in the flare due to lacking CMM-amount.

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.
Overview calculations about the methane amount utilised are made on a monthly and yearly basis and notified in the journal. The general supervision of the monitoring system is executed by the administration of the coal mine under the existing control and reporting system.

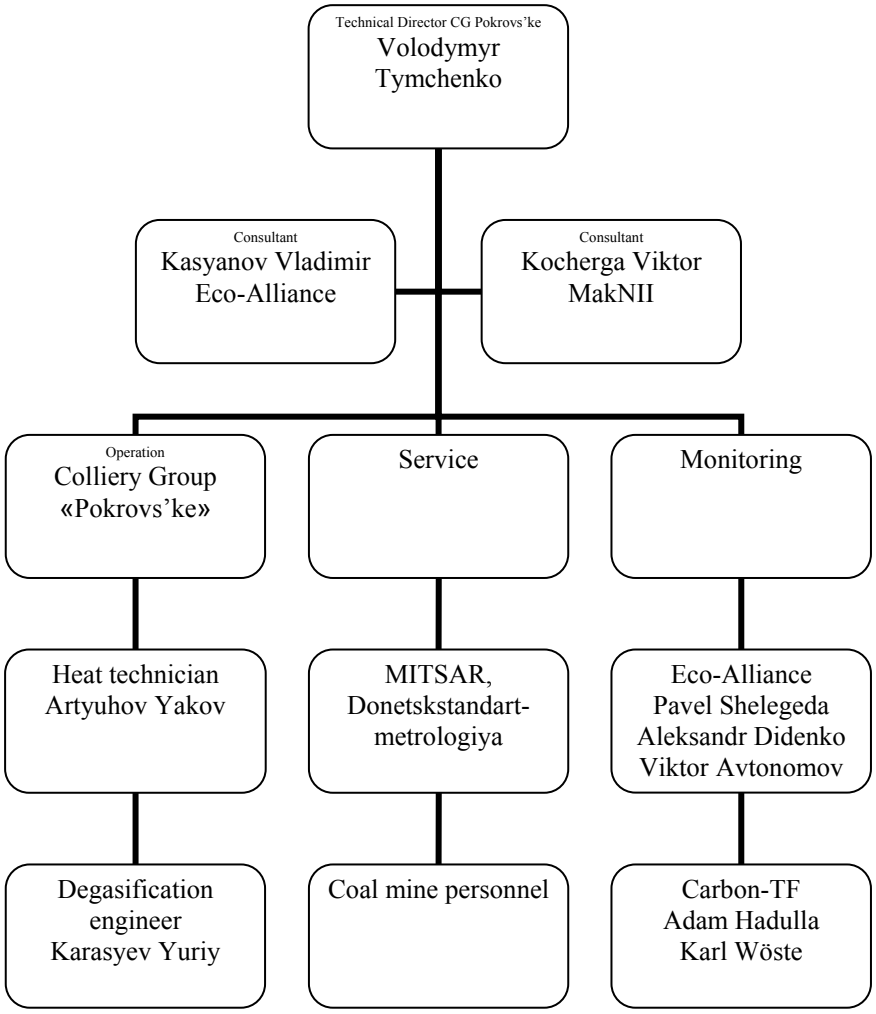

Figure 1 – Organigram

C.1.2. Trainings:

The employees responsible for the monitoring control have been trained on–the–job during the installation of the system. The responsible personnel of Eco-Alliance has 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.

C.2. Involvement of Third Parties:

- Sumystandartmetrolologiya, a is a subsidiary 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, has been involved for the regular calibration of the on-line gas analysers.
- Respirator has been involved for the lab analysis (NHMHC) of the CMM in 2008, 2009 and 2010.
- OOO Mitsar (МИЦАР) has been involved for the service of the boiler and calibration of the CMM flow meter.
- Eco-Alliance OOO provided the electronically data acquisition system and the monitoring activity together with the coal mine personnel

C.3. Internal audits and control measures:

Every 2 weeks a monitoring engineer from Eco-Alliance makes audits and remarks this in the operation 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.
Eco-Alliance makes service audits every month.

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:

- 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.
- Carbon-TF prepares the monitoring report, which is checked by Eco-Alliance and the coal mine.
- 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 monthly by Eco Alliance OOO
- The paper data are stored at the coal mine.

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

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 PDD, struck through symbols are not used in this monitoring report. (these symbols are referring to project components which are not installed yet).

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	$PE_{MD} = (MD_{FL} \sout{+ MD_{ELEC}} + MD_{HEAT}) \times (CEF_{CH4} \sout{+ r \times CEF_{NMHC}})$
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~~	$\sout{r = PC_{NMHC} / PC_{CH4}}$
B1 BE	Baseline emissions	$BE = BE_{MR} \sout{+ BE_{Use}}$
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	$BE_{Use} = \sout{GEN * EF_{ELEC}} + (HEAT / Eff_{HEAT,coal}) * EF_{HEAT}$
B14 CMM_{PJ}	CMM captured and destroyed in the project activity	$CMM_{PJ} = (MD_{FL} + \sout{MD_{ELEC}} + MD_{HEAT})$
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. During checking the DATA, the monitoring engineer has made adjustments to the time of measurement, namely: record the exact time (hours and minutes).

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

D.3.1. Project emissions:

period	project emissions [t CO_{2eq}]
01/04/2010-31/12/2010	12,473
01/01/2011-28/02/2011	6,134
Total 2010-2011	**18,607**

D.3.2. Baseline emissions:

period	baseline emissions [t CO_{2eq}]
01/04/2010-31/12/2010	100,880
01/01/2011-28/02/2011	50,217
Total 2010-2011	**151,097**

D.3.3. Leakage:

Not applicable.

D.3.4. Summary of the emissions reductions during the monitoring period:

period	Emission reductions [t CO_{2eq}]
01/04/2010-31/12/2010	88,407
01/01/2011-28/02/2011	44,083
Total 2010-2011	**132,489**

Annex 1

REFERENCES

- Project Design Document; Version 04, dated 2008-10-22
- 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. M000013, 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 Endorsment, 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
- 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

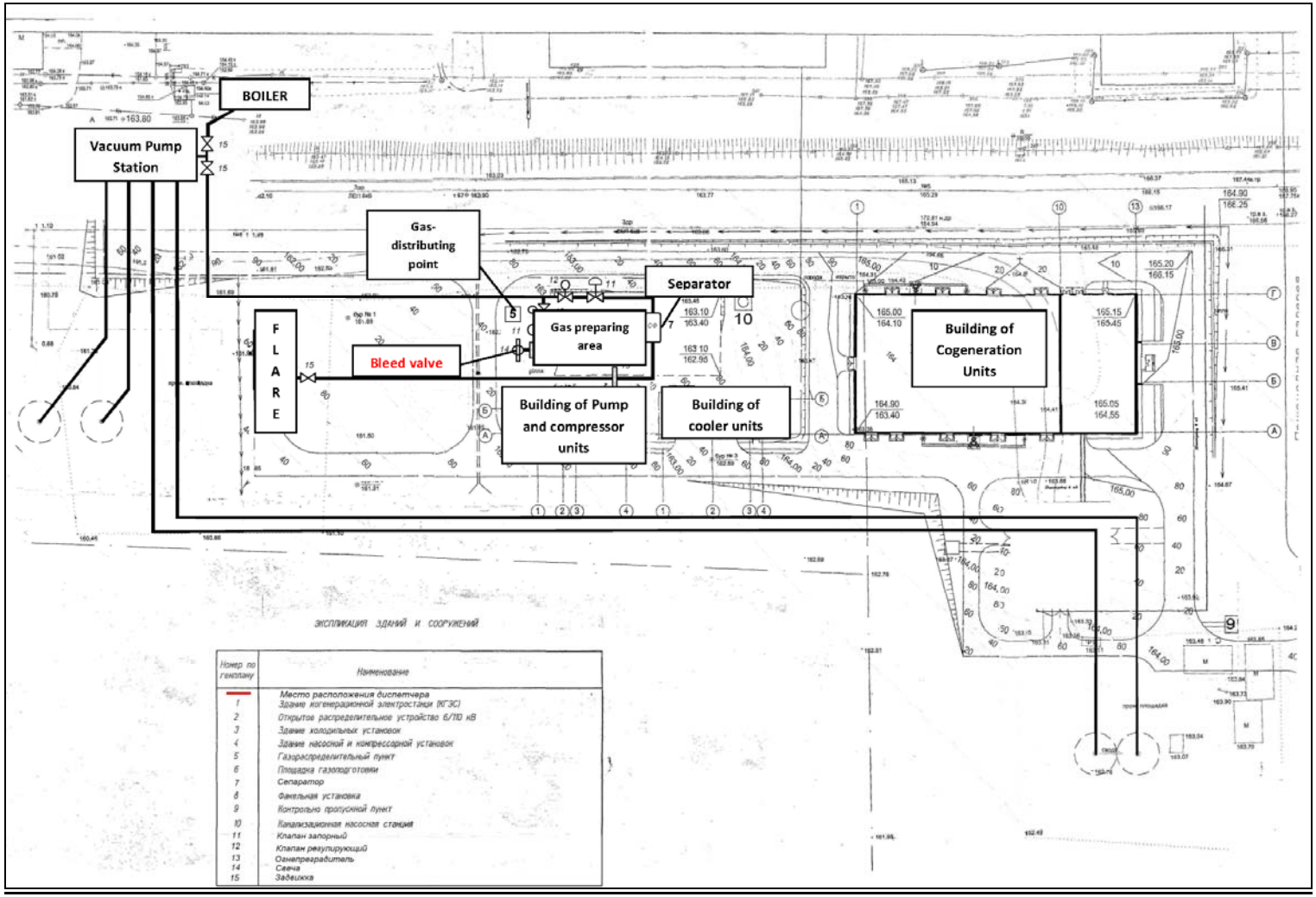

Figure-2 Location Plan – «Colliery Group «Pokrovs'ke», Central Shaft

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

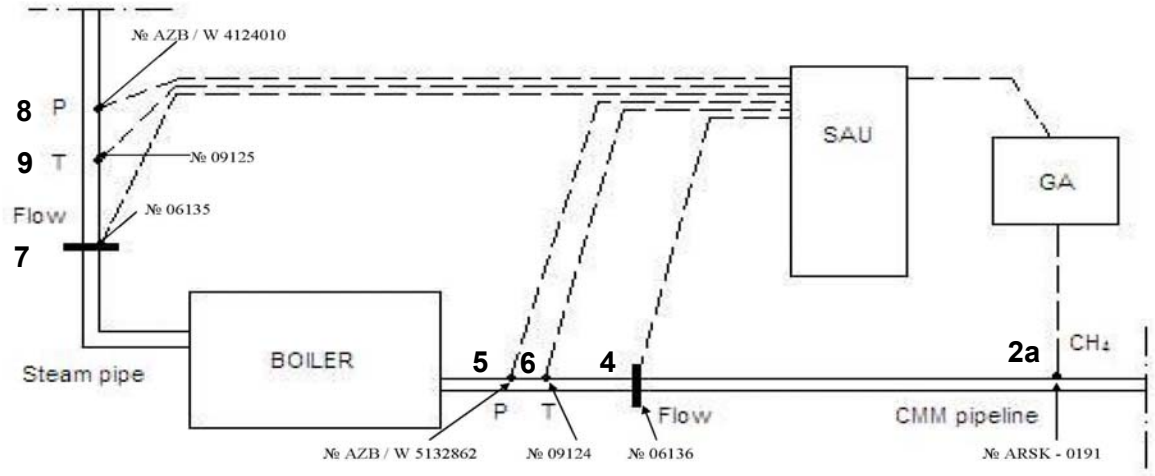

Figure-6 – Installation scheme of the boiler monitoring system
2a) concentration measurement – Draeger Politron
4) CMM flow meter - Vortex
5) CMM pressure
6) CMM temperature
7) steam flow meter - Vortex
9) steam pressure
9) steam temperature

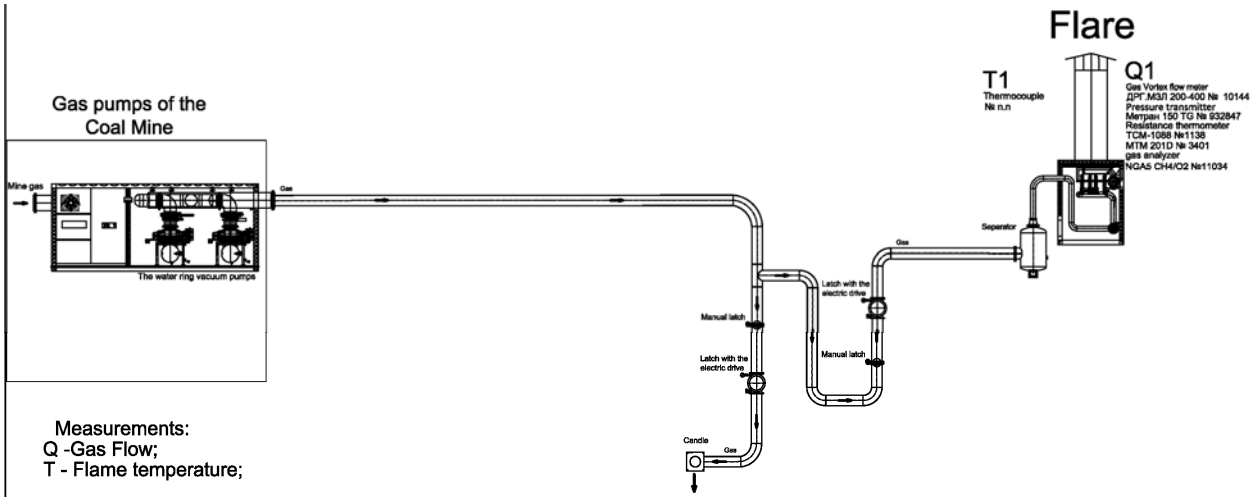

Figure-6 – Installation scheme of the flare monitoring system

Q1) CMM flow meter - Vortex
pressure transmitter – Metran 150 TG
resistance thermometer – TCM-1088
gas analyser - NGA5

T1) Thermocouple - THAU-205

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:

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

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

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

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
> 850°C	99.5%	[PDD, revised monitoring plan Section D.1.1 and Annex 3]
500-850°C	90.0%	[AM_Tool_07-15]
< 500°C	0%	[AM_Tool_07-15]

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. Operation of flare unit not at full capacity is connected with work of the gas boiler (25 MWt) during winter time, which is installed in the boilerhouse of the main site which provides heat to technological surface complex and which utilizes practically all amount of the air-methane mixture. At the end of the heating season (April 15) the entire volume of extracted air-methane mixture will be burned at the flare HOFGAS.
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 end of 2011.
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 July 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 end of 2011.

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	10 March 2011	Initial adoption. sent to JISC
2	08 April 2011	Second version, resubmitted to JISC