

## 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 5  
18 May 2011

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## 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» <sup>1)</sup>	no
Netherlands	Carbon-TF B.V.	no

<sup>1)</sup> 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](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<sub>2</sub>.

The construction of the cogeneration station at the air shaft has started already in 2008 but remained unfinished until the end of the monitoring period. Initial operation is expected in July 2011.

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 <sub>4</sub> [m <sup>3</sup> /period]	Heat generated [MWh]
01/04/2010-31/12/2010	6,093,397	24,397
01/01/2011-28/02/2011	3,007,936	13,162
<b>Total 2010-2011</b>	<b>9,101,333</b>	<b>37,559</b>

### 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 ACM0008 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 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

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*Table-2 Status of Implementation*

<b>Unit:</b> upgraded previously coal fired steam boiler at central shaft	
<b>Manufacturer:</b> Biysk Boiler Plant	
<b>Type:</b> KE-25-14KC	
<b>Serial Number:</b> 6827 (not visible)	
<b>Inventar Number:</b> 4022 (visible)	
<b>Capacity:</b> 25 t/h steam (approx. 25 MW)	
<b>Activity</b>	<b>Status</b>
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

<b>Unit:</b> Flare 1	
<b>Manufacturer:</b> Hofstetter Umwelttechnik AG	
<b>Type:</b> HOFGAS®-IFL4c 9000	
<b>Serial Number:</b> H 10244	
<b>Capacity:</b> max. 9,000 m³/h gas (20-40% CH <sub>4</sub> ), max 25 MW firing capacity	
<b>Activity</b>	<b>Status</b>
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*

<b>unit</b>	<b>installation date (PDD)</b>	<b>firing capacity</b>	<b>planned installation new timetable</b>
<b>Central Shaft</b>			
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	Jul 2011
<b>Degassing wells</b>			
flare/pump No: 2	Jan 2008	5 MW	End of 2011
flare/pump No: 7	Apr 2008	5 MW	End of 2011
<b>Air Shaft № 2</b>			

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-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  $MD_{F1}$  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»<sup>)</sup>

- 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

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

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**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*

<b>ID</b>	<b>Data</b>	<b>Method</b>	<b>Manufacturer</b>	<b>Classification</b>	<b>Serial number</b>	<b>Frequency of measurement</b>	<b>Installation</b>	<b>Range</b>	<b>Uncertainty level of data</b>	<b>Calibration procedure</b>	<b>Last calibration</b>	<b>Calibrator</b>
2a	CH <sub>4</sub> 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 OOO every 2 weeks.	28/12/2010	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	"Sibnefteavtomatika" IJSC, Tyumen, Russia	DRG.MZ-300	06136	measurement continuous record period 15 min.	Sep 2009	562.5-22,500 m <sup>3</sup> /h	1.5% in the range: 0.1 V <sub>max</sub> to 0.9 V <sub>max</sub> *)	Calibration made using procedures of the manufacturer. Calibration frequency – 3 years	30/04/2009	Manufacturer

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ID	Data	Method	Manufacturer	Classification	Serial number	Frequency of measurement	Installation	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	"Sibnefteavtomatika" IJSC, Tyumen, Russia	DRG.MZ-200	06135	measurement continuous record period 15 min.	Sep 2009	250-10,000 m <sup>3</sup> /h	1.5% in the range: 0.1 V <sub>max</sub> to 0.9 V <sub>max</sub> *)	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	August 2009 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	for AZB/W 4124010: 08.10.2009	Manufacturer
9	Steam Temperature (boiler)	Resistance thermometer	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 (consists of flow calculation unit BVR M and Gas flow transmitter DRG MZ 200-	"Sibnefteavtomatika" IJSC, Tyumen, Russia	SVG MZ-400	none	measurement continuous record period 15 min.	2010			Calibration made using procedures of the manufacturer. Calibration frequency	By manufacturer	Manufacturer

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ID	Data	Method	Manufacturer	Classification	Serial number	Frequency of measurement	Installation	Range	Uncertainty level of data	Calibration procedure	Last calibration	Calibrator
		400)								– 3years		
11	CMM amount to flare	flow calculation unit	"Sibnefteavtomatika" IJSC, Tyumen, Russia	BVR M	10512	measurement continuous record period 15 min.	2010	n.a	1.5% in the range: 0.1 V <sub>max</sub> to 0.9 V <sub>max</sub> *)	Calibration made using procedures of the manufacturer. Calibration frequency – 3years	20/07/2010 By manufacturer	Manufacturer
12	CMM amount to flare	Gas flow transmitter	"Sibnefteavtomatika" IJSC, Tyumen, Russia	DRG MZ 200-400	10144	measurement continuous record period 15 min.	2010	2,000-40,000 m <sup>3</sup> /h	1.5% in the range: 0.1 V <sub>max</sub> to 0.9 V <sub>max</sub> *)	Calibration made using procedures of the manufacturer. Calibration frequency – 3 years	20/07/2010 By manufacturer	Manufacturer
13	CMM pressure (flare)	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 manufacturer	Manufacturer
14	CMM pressure (flare)	Measuring Transformer	Microterm	MTM700DI-Ex	1595	measurement continuous record period 15 min.	2010	0÷0,1 MPa	0,25%	Calibration made using procedures of the manufacturer. Calibration frequency – 1 year	14/07/2010 By manufacturer	Manufacturer
15	CMM Temperature	Resistance Thermometer	Electrotermometriya	TSM-1088	1138	measurement continuous record period 15 min.	2010	-50-150	0.77°C	Calibration made using procedures of the manufacturer. Calibration frequency - 1 year.	06/2010 By manufacturer	Manufacturer



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<b>ID</b>	<b>Data</b>	<b>Method</b>	<b>Manufacturer</b>	<b>Classification</b>	<b>Serial number</b>	<b>Frequency of measurement</b>	<b>Installation</b>	<b>Range</b>	<b>Uncertainty level of data</b>	<b>Calibration procedure</b>	<b>Last calibration</b>	<b>Calibrator</b>
16	CMM Temperature	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
17	CH <sub>4</sub> Concentration	Infrared measurement	NUK	NGA5 CH <sub>4</sub> /O <sub>2</sub>	11034	measurement continuous record period 15 min.	2010	0...100% CH <sub>4</sub> 0...25% O <sub>2</sub>	2 %	Calibration made using procedures of the manufacturer. Calibration frequency – 1 year	06/07/2010 By manufacturer	Manufacturer
18	Flare Temperature	Thermo couple	RPE “ELEMER”	THAU-205	7459...7468	measurement continuous record period 15 min.	2010	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

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\*) The velocities are always in the specified range. The velocities correspond to the following gas flows:

ID 4 CMM flow:	$Q_{min} = 562.5 \text{ m}^3/\text{h}$ ,	$Q_{max} = 22,500 \text{ m}^3/\text{h}$
ID 7 steam flow:	$Q_{min} = 250.0 \text{ m}^3/\text{h}$ ,	$Q_{max} = 10,000 \text{ m}^3/\text{h}$
ID 10 CMM flow	$Q_{min} = 1,000 \text{ m}^3/\text{h}$ ,	$Q_{max} = 40,000 \text{ m}^3/\text{h}$

\*\*\*) The Draeger Politron is mainly a CH<sub>4</sub> 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<sub>4</sub> according to the Draeger manual.

The conversion of the errors from LEL to % CH<sub>4</sub> in the gas mixture gives the following values:

*Table-5 Uncertainty levels of the Draeger Politron*

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

**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.

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**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*

<b>ID number</b>	<b>Data variable</b>	<b>Source of data</b>	<b>Data unit</b>	<b>Comment</b>
P13 Eff <sub>FL</sub>	Flare combustion efficiency	revised monitoring plan	t CH <sub>4</sub>	Set to: 99.5 % for T <sub>flare</sub> > 1000°C 90.0 % for 500°C < T <sub>flare</sub> < 1000°C 0.0 % for T <sub>flare</sub> < 500°C
<del>P16</del> <del>Eff<sub>ELEG</sub></del>	<del>Efficiency of methane destruction / oxidation in power plant</del>	<del>IPCC</del>	<del>%</del>	<del>set at 99.5% (IPCC)</del>
P19 Eff <sub>HEAT</sub>	Efficiency of methane destruction / oxidation in heat plant	ACM0008 / IPCC	%	set at 99.5% (IPCC)
P23, B19 CEF <sub>CH4</sub>	Carbon emission factor for combusted methane	ACM0008 / IPCC	t CO <sub>2</sub> eq/t CH <sub>4</sub>	set at 2.75 t CO <sub>2</sub> eq/t CH <sub>4</sub>
P28, B18 GWP <sub>CH4</sub>	Global warming potential of methane	ACM0008 / IPCC	t CO <sub>2</sub> eq/t CH <sub>4</sub>	set at 21
<del>B49</del> <del>EF<sub>ELEG</sub></del>	<del>CO<sub>2</sub> emission factor of the grid</del>	<del>data calculated and published by SenterNovem [SenterNovem]</del>	<del>t CO<sub>2</sub> / MWh</del>	<del>Should a new officially approved standardised baseline for Ukraine be adopted, the baseline carbon emission factor will be changed accordingly.</del>
B55 EF <sub>HEAT</sub>	CO <sub>2</sub> emission factor of fuel used for captive power or heat	IPCC 2006 1 Introduction Table 1.2	tCO <sub>2</sub> /MWh	set to 0.3406 tCO <sub>2</sub> /MWh Using the value for "Other Bituminous Coal" of 94,600 kg CO <sub>2</sub> /TJ
B57 Eff <sub>COAL</sub>	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*

<b>ID number</b>	<b>Data variable</b>	<b>Source of data</b>	<b>Data unit</b>	<b>Comment</b>
P1 PE	Project emissions	monitored data	tCO <sub>2</sub> eq	calculated using formulae from the revised monitoring plan
<del>P2</del> <del>PE<sub>ME</sub></del>	<del>Project emissions from energy use to capture and use methane</del>	<del>monitored data</del>	<del>tCO<sub>2</sub>eq</del>	<del>calculated using formulae from the revised monitoring plan</del>
P3 PE <sub>MD</sub>	Project emissions from methane destroyed	monitored data	tCO <sub>2</sub> eq	calculated using formulae from the revised monitoring plan

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P4 PE <sub>UM</sub>	Project emissions from uncombusted methane	monitored data	t CO <sub>2eq</sub>	calculated using formulae from the revised monitoring plan
P5 CONS <sub>ELEC,PJ</sub>	Additional electricity consumption by project	electricity meter	MWh	
P8 CEF <sub>ELEC,PJ</sub>	Carbon emission factor of CONS <sub>ELEC,PJ</sub>	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 <sub>Flare</sub>	Project emissions from flaring	monitored data	t CO <sub>2eq</sub>	calculated using formulae from the revised monitoring plan
P11 MD <sub>FL</sub>	Methane destroyed by flaring	calculated	t CH <sub>4</sub>	calculated using formulae from the revised monitoring plan
P12 MM <sub>FL</sub>	Methane sent to flare	measured ID's- 10-13	t CH <sub>4</sub>	
P14 MD <sub>ELEC</sub>	Methane destroyed by power generation	monitored data	t CH <sub>4</sub>	calculated using formulae from the revised monitoring plan
P15 MM <sub>ELEC</sub>	Methane sent to power generation	monitored data	t CH <sub>4</sub>	calculated using formulae from the revised monitoring plan
P17 MD <sub>HEAT</sub>	Methane destroyed by heat generation	monitored data	t CH <sub>4</sub>	calculated using formulae from the revised monitoring plan
P18 MM <sub>HEAT</sub>	Methane sent to boiler	flow meter	t CH <sub>4</sub>	calculated using formulae from the revised monitoring plan
P24 CEF <sub>NMHC</sub>	Carbon emission factor for combusted non methane hydrocarbons (various)	lab analysis	-	calculated if applicable
P25 PC <sub>CH4</sub>	Concentration of methane in extracted gas	IR measurement	%	
P26 PC <sub>NMHC</sub>	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 <sub>2eq</sub>	calculated using formulae from the revised monitoring plan
B3 BE <sub>MR</sub>	Baseline emissions from release of methane into the atmosphere that is avoided by the project activity	monitored data	t CO <sub>2eq</sub>	calculated using formulae from the revised monitoring plan

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B4 BE <sub>Use</sub>	Baseline emissions from the production of power, heat or supply to gas grid replaced by the project activity	monitored data	t CO <sub>2eq</sub>	calculated using formulae from the revised monitoring plan
B14 CMM <sub>PJ</sub>	CMM captured by the project activity	flow meters	t CH <sub>4</sub>	
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 <sub>Flame</sub>	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 <sub>ELEC,PJ</sub>	Additional electricity consumption by project	electricity meter	MWh	
P12 MM <sub>FL</sub>	Methane sent to flare	measured ID's- 10-13	t CH <sub>4</sub>	
<del>P15</del> <del>MM<sub>ELEC</sub></del>	<del>Methane sent to power generation</del>	<del>monitored data</del>	<del>t CH<sub>4</sub></del>	<del>calculated using formulae from the revised monitoring plan</del>
P18 MM <sub>HEAT</sub>	Methane sent to boiler	flow meters	t CH <sub>4</sub>	
P25 PC <sub>CH4</sub>	Concentration of methane in extracted gas	IR measurement	%	
P26 PC <sub>NMHC</sub>	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 <sub>PJ</sub>	CMM captured by the project activity	flow meter	t CH <sub>4</sub>	
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**

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 be 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:**

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. The general supervision of the monitoring system is executed by the administration of the coal mine under the existing control and reporting system.

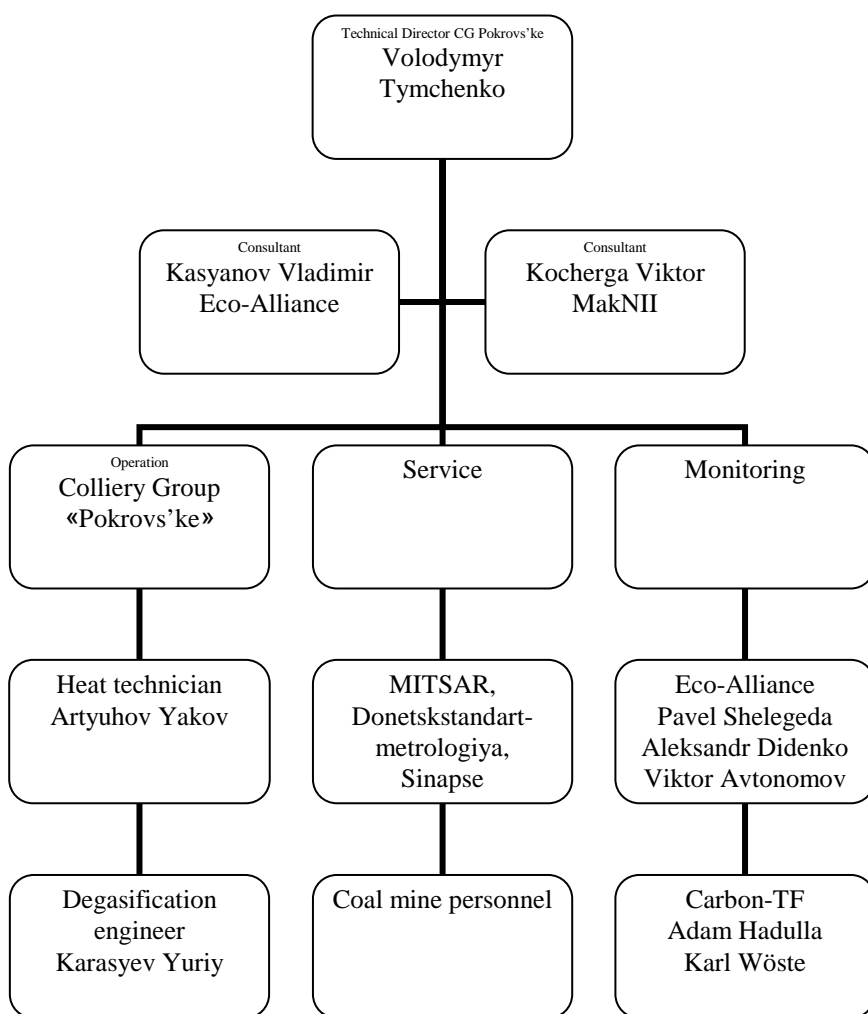


Figure 1 – Organigram

**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 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.

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:**

- Sumystandartmetrologiya, 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

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 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:**

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 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.

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 coalmine's Cogeneration Section.
- Data are recorded manually in journals by personnel of the coalmine's Cogeneration Section.
- The journals are checked daily by engineer of technical diagnostics and cross-checked by the programmers of the Cogeneration Section.
- The paper data are stored at the coal mine.
- Ever 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	$PE = \cancel{PE_{ME}} + PE_{MD} + PE_{UM}$
P2 PE <sub>ME</sub>	Project emissions from energy use to capture and use methane	$PE_{ME} = \cancel{CONS_{ELEC,PJ}} \times \cancel{CEF_{ELEC,PJ}}$
P3 PE <sub>MD</sub>	Project emissions from methane destroyed	$PE_{MD} = (MD_{FL} + \cancel{MD_{ELEC}} + MD_{HEAT}) \times (CEF_{CH4} + r \times CEF_{NMHC})$
P4 PE <sub>UM</sub>	Project emissions from uncombusted methane	$PE_{UM} = GWP_{CH4} \times [\cancel{MM_{ELEC}} \times (1 - \cancel{Eff_{ELEC}}) + MM_{HEAT} \times (1 - \cancel{Eff_{HEAT}})] + PE_{Flare}$
P11 MD <sub>FL</sub>	Methane destroyed by flaring	$MD_{FL} = \sum_{i=1}^n MM_{FL,i} \times \eta_{flare,i}$
<del>P14</del> <del>MD<sub>ELEC</sub></del>	<del>Methane destroyed by power generation</del>	<del><math>MD_{ELEC} = MM_{ELEC} \times \cancel{Eff_{ELEC}}</math></del>
P17 MD <sub>HEAT</sub>	Methane destroyed by heat generation	$MD_{HEAT} = MM_{HEAT} \times \cancel{Eff_{HEAT}}$
PE <sub>Flare</sub>	Project emissions from flaring	$PE_{Flare} = (MM_{F1} - MD_{F1}) \times GWP_{CH4}$
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 <sub>MR</sub>	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 <sub>Use</sub>	Baseline emissions from the production of power, heat or supply to gas grid replaced by the project activity	$BE_{Use} = \cancel{GEN} * \cancel{EF_{ELEC}} + (HEAT / \cancel{Eff_{COAL}}) * \cancel{EF_{HEAT}}$
B14 CMM <sub>PJ</sub>	CMM captured in the project activity	$CMM_{PJ} = (MM_{FL} + \cancel{MM_{ELEC}} + MM_{HEAT})$
ER	Emission reductions	$ER = BE - PE$

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### 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. Comparison

Period	Prospected emission reductions, PDD [t CO <sub>2eq</sub> ]		Monitored emission reductions [t CO <sub>2eq</sub> ]	
	Full year	Proportionally for the monitoring period	In tonnes CO <sub>2eq</sub> and percentage of the prospected emission reductions	
01/04/2010-31/12/2010	1,792,123 (2010)	1,344,092	90,256	6.7%
01/01/2011-28/02/2011	1,787,002 (2011)	297,834	45,141	15,2%
<b>Total 2010-2011</b>		<b>1,641,926</b>	<b>135,397</b>	<b>8.2%</b>

The monitored values are significantly lower than the prospected values, because big parts of the project have not been installed until the end of the monitoring period. Additionally there was a lack in the gas amount produced by the coal mine, so that the flare was not fully running during the monitoring period.

#### D.3.2 Monitored project emissions

Monitored project emissions [t CO <sub>2eq</sub> / a]			
	01/04/2010-31/12/2010	01/01/2011-28/02/2011	Total 2010-2011
methane destruction			
flaring	1,054	358	1,412
heat generation	11,744	5,891	17,635
power generation	0	0	0
additional power consumption			
power generation	0	0	0
<b>Total</b>	<b>12,798</b>	<b>6,249</b>	<b>19,047</b>

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**D.3.3 Monitored baseline emissions**

<b>Monitored baseline emissions [t CO<sub>2</sub>eq / a]</b>			
year	01/04/2010-31/12/2010	01/01/2011-28/02/2011	<b>Total 2010-2011</b>
release of methane that is avoided by the project			
flaring	4,946	1,751	6,697
heat generation	86,802	43,540	130,342
power generation	0	0	0
production of heat that is displaced by the project	11,306	6,099	17,405
production of power that is displaced by the project	0	0	0
<b>Total</b>	<b>103,054</b>	<b>51,390</b>	<b>154,444</b>

**D.3.4 Project emissions, baseline emissions and emission reductions**

Year	Monitored project emissions (tonnes of CO <sub>2</sub> equivalent)	Monitored leakage (tonnes of CO <sub>2</sub> equivalent)	Monitored baseline emissions (tonnes of CO <sub>2</sub> equivalent)	Monitored emissions reductions (tonnes of CO <sub>2</sub> equivalent)
01/04/2010-31/12/2010	12,798	-	103,054	90,256
01/01/2011-28/02/2011	6,249	-	51,390	45,141
<b>Total (tonnes of CO<sub>2</sub> equivalent)</b>	<b>19,047</b>	<b>-</b>	<b>154,444</b>	<b>135,397</b>

**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 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**

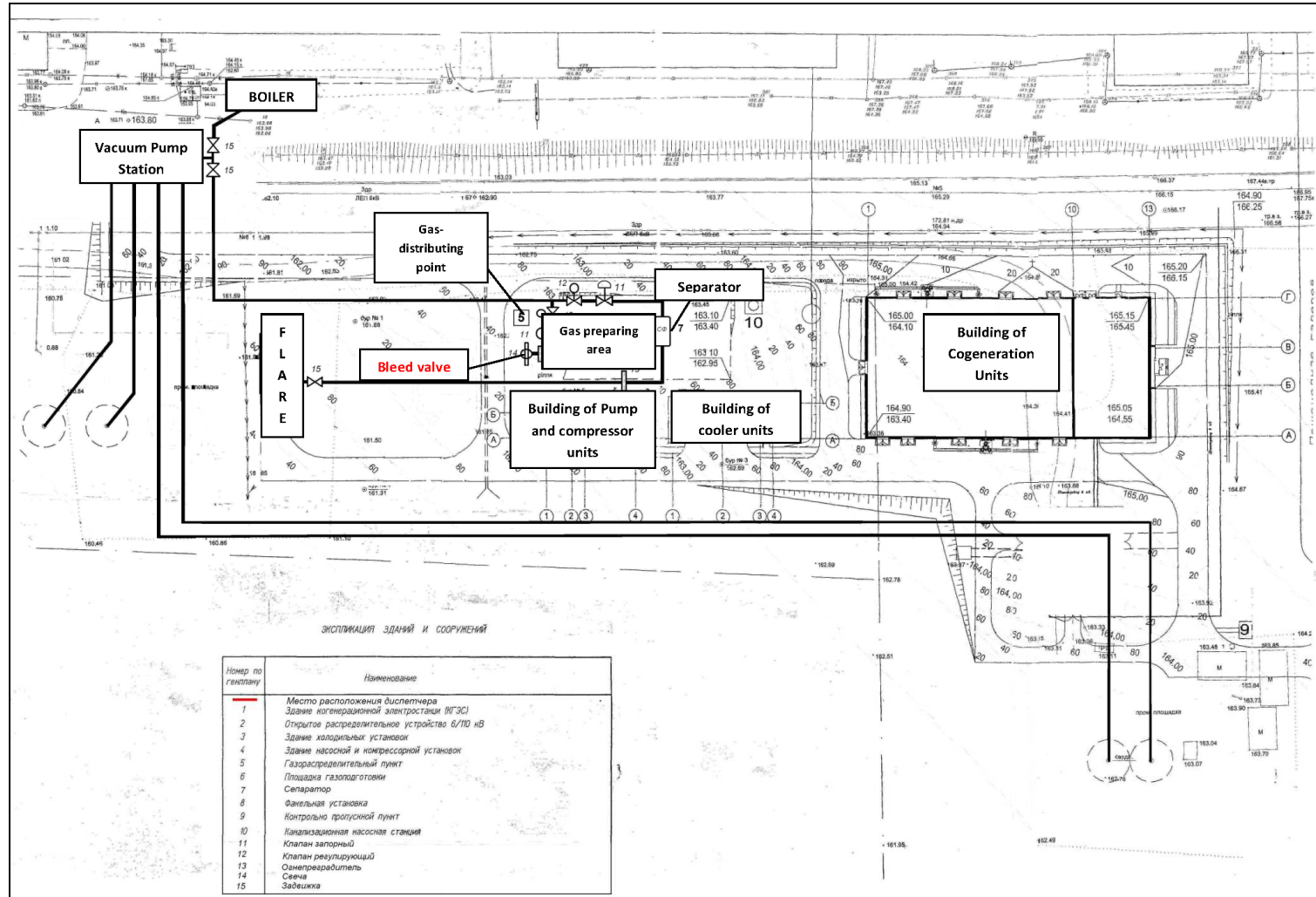


Figure-2 Location Plan – «Colliery Group «Pokrovs'ke», Central Shaft

**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<sub>4</sub> concentration is measured by a Draeger Politron meter, which is mainly a CH<sub>4</sub> 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<sub>4</sub> 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.

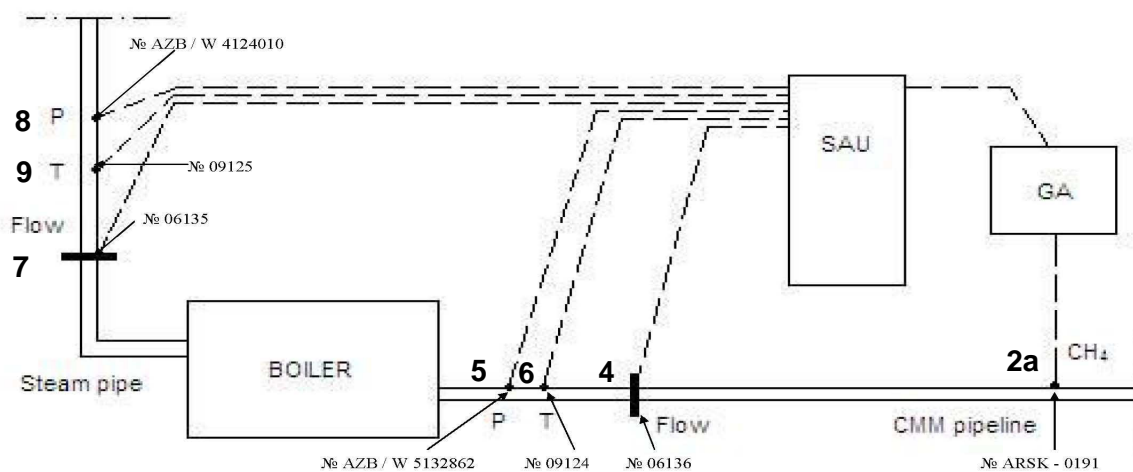
**A3.2 Measurement unit installation**

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

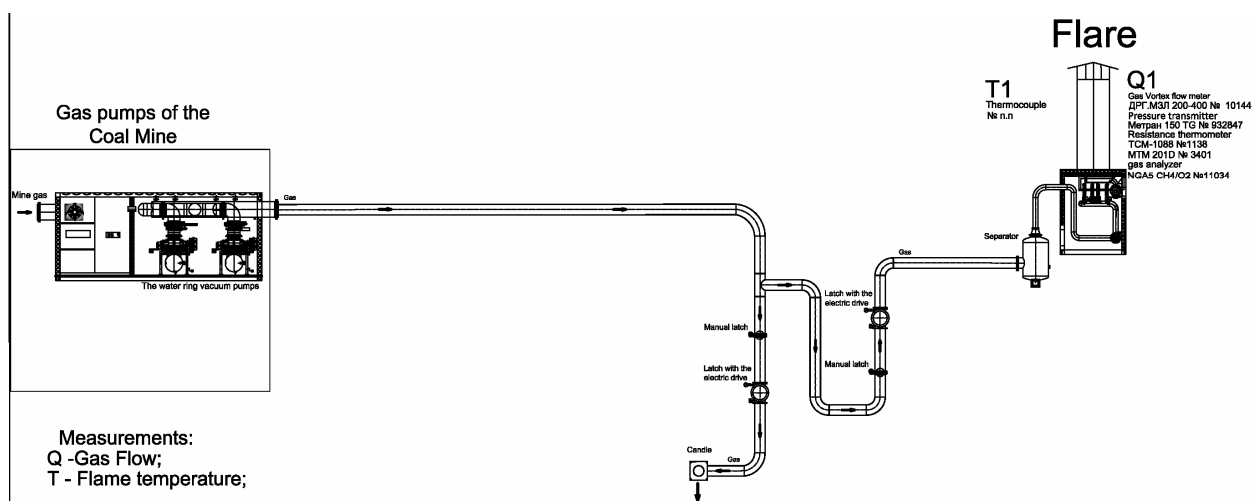


Figure-6 – Installation scheme of the flare monitoring system

- 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:

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

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<sub>Flare</sub> 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:

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

where:

- PE<sub>Flare</sub> Project emissions from flaring in the regarded period (t CO<sub>2</sub>eq)
- TM<sub>RG,i</sub> Mass flow rate of methane in the regarded interval i (kg/interval)
- η<sub>flare,i</sub> flare efficiency in the interval i
- GWP<sub>CH4</sub> Global warming potential of methane (21 tCO<sub>2</sub>eq/tCH<sub>4</sub>)
- n number of samples (intervals) in the regarded period

and

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

where:

- MD<sub>FL</sub> Methane destroyed through flaring in the regarded period (t CH<sub>4</sub>)
- MM<sub>FL</sub> Methane sent to flaring in the regarded period (t CH<sub>4</sub>)
- PE<sub>Flare</sub> Project emissions from flaring in the regarded period (t CO<sub>2</sub>eq)
- GWP<sub>CH4</sub> Global warming potential of methane (21 tCO<sub>2</sub>eq/tCH<sub>4</sub>)

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:

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- PE<sub>Flare</sub>      Project emissions from flaring in the regarded period (t CO<sub>2</sub>eq)
- MD<sub>Fl</sub>        Methane destroyed through flaring (t CH<sub>4</sub>)
- MM<sub>Fl</sub>        Methane measured sent to flaring (t CH<sub>4</sub>)
- GWP<sub>CH4</sub>     Global warming potential of methane (21 tCO<sub>2</sub>eq/tCH<sub>4</sub>)

The formula for the methane destroyed through flaring is:

$$MD_{FL} = \sum_{i=1}^n MM_{FL,i} \times \eta_{flare,i} \tag{5}$$

where:

- MD<sub>FL</sub>        Methane destroyed through flaring (t CH<sub>4</sub>)
- MM<sub>FL,i</sub>      Methane sent to flaring in the interval i (t CH<sub>4</sub>)
- $\eta_{flare,i}$       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<sub>Flame,i</sub> of the flare in the interval i:

T <sub>Flame,i</sub>	$\eta_{flare,i}$	Source
> 1000°C <sup>*)</sup>	99.5%	revised monitoring plan Section D.1.1 and Annex 2
500-1000°C <sup>*)</sup>	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<sub>Flame,i</sub>      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.

<b>unit</b>	<b>difference</b>	<b>justification</b>
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.

## MONITORING REPORT FORM

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**

<b>Version</b>	<b>Date</b>	<b>Nature of Revision</b>
1	10 March 2011	Initial adoption. sent to JISC
2	08 April 2011	Second version, resubmitted to JISC
3	14 April 2011	Revised version
4	12 May 2011	Revised version
5	18 May 2011	Revised version