Monitoring report of JI project "Reduction of Methane Emissions at Flanged, Threaded Joints and Shut-down Devices of OJSC "Odesagas" Equipment»

Monitoring period: 01.02.2011 – 30.04.2011

Version: 02 as of 06.05.2011

Contents:

[1] Appendix A is given in electronic form

Section A. General project activity and monitoring information

A.1. Title of the project

“Reduction of Methane Emissions at Flanged, Threaded Joints and Shut-down Devices of OJSC “Odesagas” Equipment»

A.2. Status of JI project

JI project “Reduction of Methane Emissions at Flanged, Threaded Joints and Shut-down Devices of OJSC “Odesagas” Equipment» was determined by the Bureau Veritas Certification, determination report No. 0118/2010 as of 15.05.2010. The project was approved by the National Environmental Investment Agency of Ukraine (Letter of Approval No.737/23/7 of June 07, 2010) and Ministry of Climate and Energetics of Denmark and Energy Agency of Denmark (Letter of Approval No. 1602 of June 01, 2010).

A.3. Short description of the project activity

The following methane emission reductions were achieved as a result of rehabilitation of the flanged, threaded joints and shut-down devices conducted by OJSC “Odesagas” in accordance with this project:

Reduction of methane leakages since 01/02/2011 to 30/04/2011, м3	10 180 138
Reduction of GHG leakages since 01/02/2011 to 30/04/2011, tCO2eq	153 239

A.4. Monitoring period

Starting date: 01.02.2011
Closing date: 30.04.2011

A.5. Methodology applied for project activity

A.5.1. Baseline methodology

The methodology approved by the Clean Development Mechanism Executive Committee AM0023 version 3 dated 30.10.2009 **«Reduction of natural gas leaks at compressor or gas distribution stations of main gas lines»** (http://cdm.unfccc.int/UserManagement/FileStorage/JY2L0XEKMB3HD18T7RPO6ZSFCQINGA) with the more precise definition of the method for measurement of leakage volume and as stated in clause B.1 PDD version 07.

A.5.2. Monitoring methodology

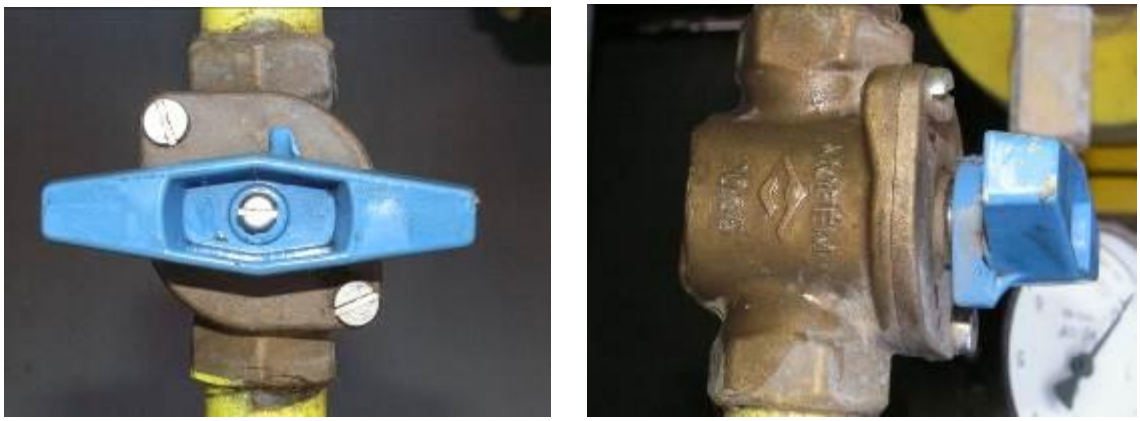
For quantitative estimation and preparation for reporting on emission reduction on the ground of baseline and project's activity the approved methodology of monitoring conducting AM0023 was applied as stated above, with the more precise definition of the method for measurement of leakage volume and as stated in clause B.1 PDD version 07.

Indefiniteness of measurement method was taken into account in the course of making calculations as to GHG emission reductions (see section D of PDD version 07).

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

According PDD version 7 the project boundary include the methane leakage places as a result non-hermetic flanged, threaded joints and shut-down devices of gas distribution pipeline in Odessa and Odessa region. Total project boundary was included 11174 shut-down devices. During 2005 – 2010 years at the frame of project was off-planed repaired and changed 11165 shut-down devices. During monitoring period was off-schedule repaired and changed 9 shut-down devices. List of all repaired (changed) shut-down devices during monitoring period are in the Annex A to the Monitoring Report.
Photos of shut-down devices of Italian, Hungarian and domestic production which in the project frame have been installed instead of the obsolete equipment are on the Pictures 1-4.

Pic. 1. Gland valve threaded of Italian production



Pic. 2. Ball valve of Hungarian production

Pic. 3. Ball valves threaded of Italian production

Pic. 4. Ball valve flanged of domestic production (Lugansk).

The data of the spent works year by year are present in the Table 1.

Year	Quantity of repaired (changed) shut-down devices
2005	5 832
2006	3 312
2007	529
2008	752
2009	566
2010	174
since 01/02/2011 to 30/04/2011	9
Total	**11 174**

Table 1. Quantity of non-planned repaired (changed) shut-down devices year by year.

The project activity for current monitoring period (February – April 2011) is further accomplishment of purposeful examination and technical maintenance (PETM) of all flanged, threaded joints and shut-down devices of OJSC "Odesagaz" gas distributing pipeline, which have been repaired (packaged, replaced) during all JI project operation time.

Repaired (packaged, replaced) during 2005-2011 years shut down devices will be regularly checked as a part of a standard monitoring program to make sure they have not become the source of leakage again.

According to Monitoring Plan in PDD version 07 the regular repairs of the shut down devices are done once per year, technical maintenance – once per half year.

Methane leakage volumes received in the result of measurements on the repairing (changing) shut down devices are not exceeding the methane leakage volumes, which was measured after the first repair of equipment.

A.7. Possible deviations or revisions of PDD registered version

There are no significant deviations from PDD registered version. Insignificant deviation of actual GHG emission reductions from those stated in version 07 PDD is due to insufficient financing of the arrangements implemented within the Project in the preceding years of project activity.

A.8. Possible deviations or revisions of registered monitoring plan

There are no deviations from registered monitoring plan.

A.9. Persons responsible for preparation and producing of monitoring report

The following employees of OJSC “Odesagas” are responsible for monitoring report: - head of working team, chief of production and technical department – N.G. Orlova, executor, scientist secretary of ITI Biotekhinka UAAN, V.Ya. Khodorchuk

Section B. Key monitoring activities

B.1.1. Applied equipment

Control and monitoring system consists of three parts:

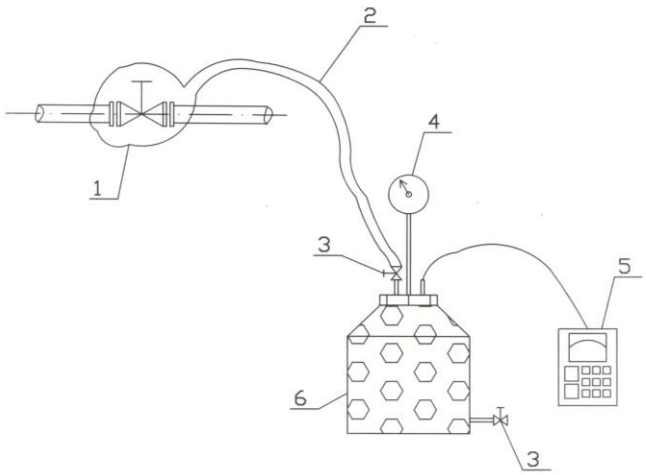
1) Measurements of methane leakage value before the rehabilitation (hermetization) of the object;
2) Measurements of methane leakage value after the rehabilitation (hermetization) of the object;
3) Archiving and processing of obtained results.

To measure leakage volume of natural gas it was decided to use the method based on the Calibrated Bag Technology described in the approved baseline strategy AM0023 "**Reduction of natural gas leakage at compressor and gas distribution stations of main gas lines**". One of the problems incurred by using this method is difficult accounting of the volume of the valves measurements are done on, and of the initial air volume upon determination of gas volume received in the bag.

A special plant was made to solve these problems. It is made on the basis of a plastic capacity of a certain volume (0,87 m^3), package, plastic hose and pressure gauge (see Picture 5). All junctions are sealed.

Pic.5. Photo of a plant for quantitative measurement of methane leakage.

Scheme of plant is represented on Picture 6.



Pic. 6. Scheme of plant for quantitative measurement of methane leakage

Signs:

1. Hermetic bag.
2. Hose.
3. Crane.
4. Pressure gauge.
5. Gas analyzer EX-TEC® SR5.
6. Hermetic tank.

Gas analyzer EX-TEC® SR5. To determine methane concentration in the sample a high-precision gas analyzer EX-TEC® SR5 is used.

- explosion-proof (CENELEC),
- gas detection upon control of pipeline networks (ppm range),
- gas detection at the internal installations (ppm range),
- alarm upon approaching the lower level of explosion (% UEG or Vol. %-range),

- measurement of concentration upon gas contamination and purging of lines (Vol. % range),
- measurement of concentration in probe aperture (Vol.%-range)

Relative error makes 10%, which conforms to EN 50054/57 Standard.

After detection and measurement of leaks appropriate repair of leaking areas will be done in flanged, threaded joints and shut-down devices, which will include both use of modern compacting materials and full replacement of worn equipment with new one.

B.1.2. Calibration procedure

The only device used in the process of methane leakage monitoring is gas analyzer EX-TEC® SR5 (serial No. 041020009). Calibration interval is 1 year.

The certificate confirming device's serviceability is issued as a result of calibration.

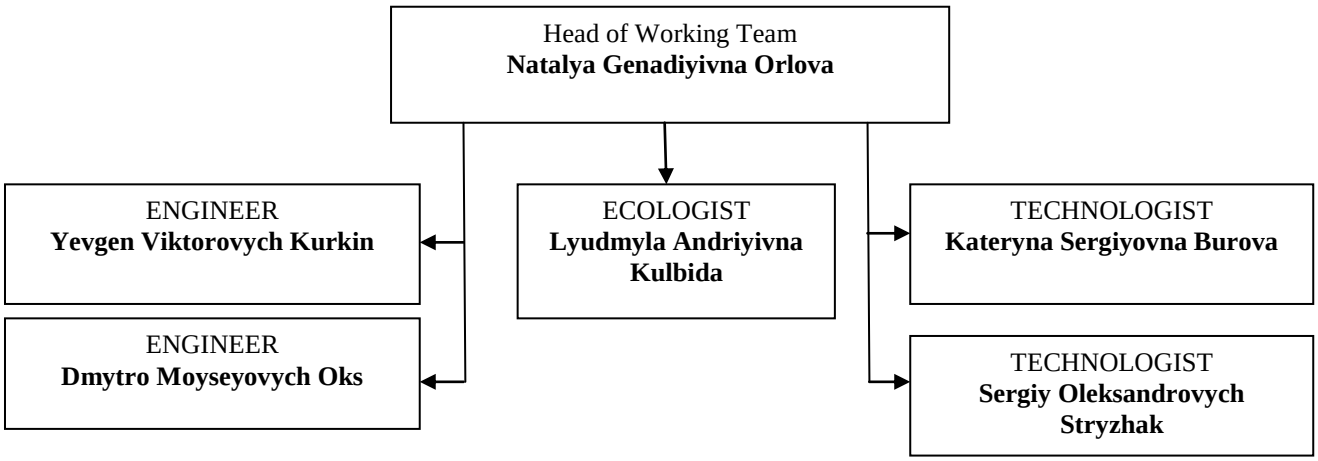
B.1.3. Involvement of Third Parties

State company «Analitgas-Service».

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

B.2.1. The operational and management structure for the operator to implement monitoring plan.

Coordination of work of all departments and services of OJSC Odesagas concerning project implementation is done by specially created Working team. The structure of Working team is shown on the Picture 7.



Pic. 7. Structure of Working team.

Sergiy Oleksandrovych Stryzhak and Lyudmyla Andriyivna Kulbida are responsible for collection of all information provided for by monitoring plan, and for making all necessary calculations. Archiving of all received information in the result of measurements and settlements is done under guidance of Kateryna Sergiyivna Burova. The head of working team (Nataliya Genadiyivna Orlova) on the basis of received information determines plan of measures under the Project and scope of resources required. Technical maintenance of the Project is carried out by Dmytro Moyseyovych Oks and Yevgen Viktorovych Kurkin.

B.2.2. List of parameters applied in the course of calculation

Parameters applied for calculation of methane leakage reduction are given below in the table 2.

Identification No.	Variable data	Source of data	Unit of data measurement	Form of data received	Comments
1. i	Serial number of bolt, cock, valve, flanged or threaded joint, where the gas leakage was detected, is eliminated and then checked.	Measurement of leakage	Dimensionless	Electronic	Detected leakage is awarded a respective No. List of shut-down devices (valves, cocks, bolts), flanged and threaded joints is given in Appendix A. Check-up after repair is conducted.
2. T_i	Time	Results of inspection	Quantity of hour of operation of the equipment, wherein the leakage was detected within the year	Electronic	Quantity of hours pf the equipment operation during the year from the moment of its repair (replacement)
3.	Date	Repair (rehabilitation) and monitoring (register) data	Date of repair (rehabilitation) and monitoring	Electronic	Date of reconstruction used together with the number of hours of equipment operation to determine general number of hours of operation Should leaks be repeated, it is taken the same as the date of last inspection which showed the absence of leakage

Identification No.	Variable data	Source of data	Unit of data measurement	Form of data received	Comments
4. GWP_{CH4}	Global warming potential	IPCC	Tones of CO2 equiv.	Electronic	Project developer will conduct monitoring of any potential changes caused by global warming for methane, published by IPCC and approved by COP
5. $F_{CH4,i}$	Speed of leakage for each detected leakage	Leakage measurement	m3 CH4/year	Electronic	Calculated by means of the largest deviation from device's error (10% for gas analyzer)
6. t, P	Gas temperature and pressure	Data of measurements of glass mercury thermometer TL-4 and manometer «D-59H-100-1.0 6 kPa».	^{0}C and kPa	Electronic	Measured for determination of CH4 density Note: Notwithstanding measurements, many variants are not expected as pressure and temperature at different stations are taken constant
7. UR_i	Equipment uncertainty factor; measurement of leakage	Information provided by manufacturer and/or IPCC GPG	%	Electronic	Where possible, 95% confidence interval is evaluated; advice of management board given in section 6 2000 IPCC of GPG If manufacturer of equipment where leaks are measured specifies uncertainty range without specification of confidence internal, it can be taken 95%
8. *Vbag*	Reservoir capacity	Data of flow meter measurement	m^3	Electronic and paper	Reservoir is filled in with water. Amount of water measured by flow meter will be reservoir capacity Measurement showed that reservoir capacity is 0.87 m^3.

Identification No.	Variable data	Source of data	Unit of data measurement	Form of data received	Comments
9. $w_{sampleCH4,i}$	Methane concentration in sample	Data of gas analyzer EX-TEC® SR5 measurements	%	Electronic	Methane concentration in sample (in reservoir) of leak *i* is the difference between methane concentration in the beginning and in the end of measurement Concentration is measured with gas analyzer EX-TEC® SR5.
10. τ_i	Time during which methane concentration in reservoir reaches certain level	Data of measurements made by seconds counter« SOS pr-2b-2»	seconds	Electronic	Time during which methane concentration in reservoir reaches certain level is determined with stop-watch. Measurement starts from the moment the tap is opened on the tank cap and ends when methane concentration inside the reservoir reaches certain level.

Table2. Parameters used in calculation of GHG emissions

B.2.3. Data as to leakages

There are no leakages in the course of project implementation (Methodology AM0023 doesn't provide for any leakages).

B.3. Data processing and archiving

All information will be processed and archived in electronic and/or paper form up to 31.12.2024.

B.4. Emergencies and technological breaches

There were no emergencies at gas distribution stations of OJSC "Odesagas" during 3 months (February – April) 2011.

B.5. Procedures for detection and liquidation of malfunctions at flanged, threaded joints and shut-down devices of OJSC "Odesagas" equipment"

Detection, liquidation and registration of failures and emergencies at flanged, threaded joints and shut-down devices of OJSC "Odesagas" equipment is carried out according to Safety rules of gas-supply systems of Ukraine.

B.6. External data (type, source, access)

External data are not used in the course of monitoring of methane emissions at gas-distribution stations of OJSC “Odesagas”.

B.7. Error level of metering equipment

Relative error of gas analyzer EX-TEC® SR5 is 10%, meeting the standard EN 50054/57. The device is calibrated annually.

Section C. Quality assurance and quality control measures

C.1. Documented procedures and management plan

C.1.1. Roles and responsibilities

Management of the project is implemented by the executive director of OJSC Odesagas, Gerasimenko V.O. He manages and coordinates the activities of all departments. Specially formed working team is responsible for collection and processing of the parameters.
Structure of data collection and project management is given in the Section B.2 of this Monitoring Report.

C.1.2. Trainings

There is no need to conduct trainings for operation with new equipment. All trainings related to the project were conducted by the equipment suppliers and their cost is included into the equipment cost.

C.2. Internal audits and control measures

The group for measurement of all necessary parameters provided for by the methane leakage monitoring plan was formed under the direction of specially created working team of OJSC “Odesagas”.

Monitoring measurements of leaks of methane is carry out in each Management of Operation of a Gas Economy (MOGE) in Odessa region.
Monitoring measurements are carry out by specially-trained personnel conformity with the Technique of carrying out of measurements.
Data of monitoring measurements directly at carrying out of measurements is fixed on a paper.
Then, on the basis of the measurements data on a paper, everyone MOGE form electronic databases, which are sent to the central office. The Central Office collect data in a uniform database of monitoring measurements of leaks.

The regular shut-down devices repairs on gas distribution pipeline of OJSC “Odesagas” are done once per year, technical maintenance – once per half year.

Repaired (packaged, replaced) shut-down devices will be regularly checked as a part of a standard monitoring program to make sure they have not become the source of leakage again.

C.3. Information about the indicators of project's social and environmental effect

The quality of gas supply of the region's population will be improved as a result of project implementation.
Also there will be decrease in natural gas losses and GHG emission reduction causing greenhouse effect and climate change.

Section D. Calculation of GHG emission reductions

D.1. Project emissions

Using the method for leakage volume measurement with the help of leakproof capacity, volume of methane leakage from one equipment can be calculated by the formula:

$$F_{CH4,iP} = Vbag * w_{sampleCH4,i} * 3600 / \tau_i \text{ ,} \qquad (1)$$

Where:
$F_{CH4,P}$ - Methane leakage through leak point *i* through leakage element after reconstruction (m^3/h);
Vbag - Volume of leakproof tank for measurement (m^3);
$w_{sampleCH4,i}$ - Concentration of methane in the leak sample *i* which is the difference of concentrations at the beginning and at the end of measurement (%);
τ_i - Average time of filling in the tank for leakage *i* after reconstruction (seconds)

Annual methane leakage is calculated by the formula:

$$Q_{yP} = ConvFactor * \Sigma[F_{CH4P} * T_{i,y} * UR_i] * GWP_{CH4} * 0.9 \text{ ,} \qquad (2)$$

Where:

Q_{yP} = Methane emissions for certain period for reconstructed device (tCO2eq);
ConvFactor = coefficient of m^3CH_4 conversion into tCH_4 subject to standard temperature and pressure (0°C and 101.3 kPa); it is 0.0007168 tCH_4/m^3CH_4;
URi = Coefficient of uncertainty of measurement methods (0,95%);
$T_{i,y}$ = Time (in hours) for corresponding component *i* and during which it was functioning (period of monitoring) *y*;
GWP_{CH4} = Methane global warming potential (21 tCO2eq/tCH4);
0.9= Coefficient taking into account equipment error

Emissions generated after implementation of project arrangements are given in the Table 3.

Period	since 01/02/2011 to 30/04/2011
Project GHG emissions, tCO2eq.	4 045

Table 3. Project emissions CO_2-eq.

D.2. Baseline emissions

Using the method for leakage volume measurement with the help of leakproof capacity, volume of methane leakage from one equipment can be calculated by the formula:

$F_{CH4,iB} = Vbag * w_{sampleCH4,i} * 3600 / \tau_i$, where (3)

$F_{CH4,B}$ - Methane leakage through component *i* due to leakage element before reconstruction (m³/h);
Vbag - Volume of leakproof tank for measurement (m³);
$w_{sampleCH4,i}$ - Concentration of methane in the leak sample *i* which is the difference of concentrations at the beginning and at the end of measurement (%);
τ_i - Average time of filling in the tank for leakage *i* after reconstruction (seconds)

Annual methane leakage is calculated by the formula:

$Q_{yB} = ConvFactor * \Sigma[F_{CH4Y} * T_{i,y} * UR_i] * GWP_{CH4} * 0.9$, (4)

Where:

Q_{yB} - Methane emissions for the period y, for equipment before the rehabilitation (tCO2eq)
ConvFactor - coefficient of m³CH_4 conversion into tCH_4 subject to standard temperature and pressure (0 °C and 101.3 kPa), it makes 0.0007168 tCH4/м³CH4
URi - Coefficient of uncertainty of measurement methods (0,95%)
$T_{i,y}$ - Time (in hours) for corresponding component i, during which it worked within the period of consideration (monitoring period) y
GWP_{CH4} = Methane Global Warming Potential (21 tCO2eq/tCH4)
0.9= Equipment Error Factor.

Emissions which will be generated in the absence of the rehabilitation arrangements are given in the Table 4.

Period	since 01/02/2011 to 30/04/2011
Baseline GHG emissions, tCO2eq.	157 284

Table 4. Baseline emissions CO2-eq.

D.3. Leakages

There is no leakage in the course of project implementation (Methodology AM0023 doesn't provide for leakage)

D.4. Emission reduction as a result of project implementation during 3 months (February – April) 2011.

Emission reduction as a result of project implementation shall be calculated as a difference in baseline and project emissions.
Quantity of emission reduction units (ERU), t CO_2e:

$$ERU = \sum[Q_{yB} - Q_{yP}] \quad (5)$$

ERU– emission reduction units, t CO_2;
Q_{yP} – project emissions, t CO_2;
Q_{yB} – baseline emissions, t CO_2.

Emissions reductions as a result of project implementation during 3 months (February – April) 2011 are given in table 5.

Period	since 01/02/2011 to 30/04/2011
GHG emissions reductions, tCO2eq.	153 239

Table 5. Emission reductions