JOINT IMPLEMENTATION PROJECT

Reduction of Natural Gas Emissions at PJSC «Creamgas»

Position of the head of the organization, institution, body, which prepared the document

Director
LLC «Energy Technology Company «Energoalians»
(position)

(signature)

Astashov O.M.
(name and patronymic, last name)

PS

Position of the economic entity – owner of the source, where the Joint Implementation Project is planned to be carried out

Head of the Board
PJSC "Creamgas"
(position)

(signature)

Dribnyi V.I.
(name and patronymic, last name)

PS

Simferopol, 2012

JOINT IMPLEMENTATION PROJECT DESIGN DOCUMENT FORM
Version 01 - in effect as of: June 15, 2006

CONTENTS

Annexes

LIST OF ABBREVIATIONS PRESENTED IN PDD

GDP – Gas-distribution point
CDM - Clean Development Mechanism
NCER – National Commission of Energy Regulation
EIE - Environment Influence Estimation
PJSC - Public joint-stock company
UGSSR – Ukrainian Gas Supply System Safety Rules
PDD – Project Design Documentation
JI – Joint Implementation
PETM – Purposeful Examination and Technical Maintenance
CGDP - cabinet-type gas-distributing point

SECTION A. General description of the project

A.1. Title of the project

Reduction of Natural Gas Emissions at PJSC "Creamgas"

Scope 10. Fugitive emissions from fuels (solid, oil and gas)

Version of Project Design Documentation: 03

Date: Septebmer 19, 2012.

A.2. Description of the project:

The purpose of the project is reduction of the natural gas emissions at gas-transport and gas-distributing infrastructure of PJSC "Creamgas", which are the result of leakage from gas equipment and gas armature. The basic sources of emissions, included into the project scope are:

- gas equipment (reducing gears, valves, filters, turning off devices and others like that), flanged and screw-thread connections which are in gas-distributing plants (GDP) and cabinet-type gas-distributing plants (CGDP) PJSC "Creamgas";
- gas armature (faucets, bolts, valves and others like that), screw-thread and flanged connections located on gas pipelines PJSC "Creamgas".

General quantity of GDP included into the boundary of the project is 357 units, CGDP – 1 118 units, number of gas armature on gas pipelines is 14 690 units.

Main reason of natural gas emissions is death of sealing elements of equipment as a result of action of temperature vibrations and moisture. Basic component of natural gas, methane (92 - 95%), is greenhouse gas. In result of natural gas sources removal will reductions of greenhouse gases emission. In future, for determination of natural gas emissions sources «emissions of methane» is used, as instrumental measurings of emissions refer to methane directly.

Situation before the start of project

PJSC "Creamgas" is an enterprise that provides transporting and supply of natural gas for industrial (226 enterprises), public-service (3 545 economies) and population (650 357 apartments and individual estate owners) in towns and villages of AR Crimea (except for Sevastopol, Feodosiya and Kerch towns), Ukraine.

The structure of existent gas transporting's tariffs, which are regulated by the state, does not take into account the depreciation and investment necessities of gas-distributing enterprises. It results in the finances shortage for repair works and modernization of gas networks, purchase of the proper technological equipment and component parts, and, as a result, influences on the increase of natural gas emissions at PJSC "Creamgas" facilities.

Before the beginning of this project realization application of Joint Implementation mechanism was foreseen, stipulated by Kyoto Protocol. March, 2004 the JI Project implementation's and own resources investment decision was signed by the Board of PJSC "Creamgas" (№149 at 15/3/2004).

Baseline scenario

Before the Project start (2004) PJSC "Creamgas" carried out only the detection of methane emissions by gas detectors in accordance with Ukrainian Gas Supply System Safety Rules[1], with the purpose of avoidance of emergency and explosive situations. Measurings of methane emissions volumes, their registration and accounting were not conducted, and the proper measuring devices were absent. Theoretical calculations of methane emissions volumes on the basis of the conducted base measurings of natural gas emissions as a result of equipment, gas armature, flanged and screw-thread connected gas pipelines leakages, PJSC "Creamgas" amounted in about 65 million m^3 per year.

Project scenario

Project activities consist in reductions of methane leaks on the GDP (CGDP) gas equipment and on the gas pipelines armature of PJSC "Creamgas" in its cosequence not tightness.

Within the framework of JI Project with the aim of elimination of methane emissions on gas equipment and on the gas armature there are three types of repairs used:

1. Complete substitution of old gas equipment and gas armature by new units.
2. Repair of gas equipment components and gas armature;
3. Replacement of pressure-sealing elements with the modern sealing materials using, changing of service and repair practice, that has become common, on the basis of paronite gaskets, and also sealing stuffing of cotton fibres with fatty impregnation and asbestos-graphite filler.

The existent practice of service and repair that has become common, on the basis of paronite gaskets, and also the sealing stuffing of cotton fibres with fatty impregnation and asbestos-graphite filler does not give long-lasting effect of methane emissions reduction. As a result of activities due to JI Project in addition to methane emissions reduction there will be natural gas technical losses reduced and contribution to ecological situation improvement, the risk of emergency and explosive situations will be reduced.

Project activities include:

- Introduction of Purposeful Examination and Technical Maintenance (PETM) of GDP (CGDP) gas equipment and gas armature flanged and threaded joints - modern and most economically-effective practice, that allows not only to find out the emissions places but also to determine their volumes (i. e. potential volume of gas losses reductions). This key information is necessary for grounding of repairs efficiency and priority choice of its objects, which is important at the insufficient financing for the removal of all emissions. This activity will include purchasing and calibration of modern measuring equipment, corresponding studies of workers, monitoring of every gas equipment and gas armature, flanged and threaded connection, creation of the methane sources' collection and storage system and also implementation the Plan of monitoring and system of methane emissions volumes' account.
- Exposure and methane emissions measuring: monitoring system of emissions on all GDP (CGDP) gas equipment, on gas armature (bolts, faucets, valves), on flanged and threaded connections, including the removed methane emissions (on the repaired components of equipment). Monitoring will be performed on regular basis by the specially taught personnel. The found out emissions will be properly marked by individual numbers, the volumes of methane emissions will be measured and registered in a database.
- Elimination of all found out methane leaks: repairs of GDP (CGDP) gas equipment and gas pipelines armature on with emissions within the framework of this Project will be varied from

[1] The Order of The State Committee of Ukraine on supervision of a labor safety Nr. 254 on 01/10/1997, registered in the Ministry of Justice of Ukraine Nr. 318/2758 on 15/05/1998.

replacement of sealing elements or pressure-sealing, to major repairs and replacement of gas equipment and gas armature by a new, modern equipment. The repaired components of GDP (CGDP) gas equipment and gas pipelines armature will be inspected regularly, as component part of standard monitoring activity, to ascertain, that they did not become the source of emissions again.

The Project was initiated in April 2004:

In April-May 2004 the inspection of GDP (CGDP) gas equipment and armature, gas pipelines' flanged and threaded joints of PJSC "Creamgas" was performed and primary measuring of emissions done, the results of which made the basis for setting the project baseline.

April 09, 2004 - the Working group was organized with the basic tasks of JI project implementation provision.

April 21, 2004 the Methodology of Measuring and Program of Emissions Monitoring was approved by order №228 of PJSC "Creamgas" administration.

April 2004 – the inspection and May 2004 – repairing works was begun on thr GDP (CGDP) gas equipment and armature, flanged and threaded joints on the PJSC "Creamgas" gas-distributing networks.

January 11, 2005, January 6, 2007 and December 6, 2011 - in the order of changes in organizational structure, the composition revision of the working group was approved.

April 05, 2012 was signed the Emission Reductions Purchase Agreement for of JI Project between Biotehnoloogia OÜ (Estonia) and PJSC "Creamgas". Financing of JI Project's PDD design is responsibility of Biotehnoloogia OÜ.

August 08, 2012 was received the Letter of Endorsement №2133/23/7 for the JI Project from the State Environmental Investment Agency of Ukraine.

Durations of project is unlimited, as PETM program, monitoring and emissions removal program were aimed at becoming a component part of PJSC "Creamgas" day by day work and may be in progress after 2017 too. Emission reduction of tCO2-eq is confirmed for the period of 13 years and 9 months in accordance with modality and procedures of JI Mechanism.

A.3. Project participants:

Party involved*	Legal entity project participant (as applicable)	Please indicate if the Party involved wishes to be considered as project participant (Yes/No)
Ukraine (Host Party)	• PJSC "Creamgas".	No
Estonia	• Biotehnoloogia OÜ	No
Ukraine (Host Party)	• LLC «Energy Technology Company «Energoalians»	No
*Please indicate if the Party involved is a host Party		

PJSC "Creamgas" is provide of natural gas transportation and supplying in towns and villages of AR Crimea (except for Sevastopol, Feodosiya and Kerch towns), Ukraine, and is the project participant. JI

Project implementation's and purchasing of the proper technological equipment and component parts by own resources investments is responcibility of PJSC "Creamgas".

Biotehnoloogia OÜ is project participant and probable buyer of Emission Reduction Units which will be created due to JI Project implementation. Financing of supplying materials and PDD design, which created by LLC «Energy Technology Company «Energoalians», is responsibility of Biotehnoloogia OÜ.

LLC «Energy Technology Company «Energoalians» is provided the JI Project design consulting service, is not the project participant. The responcibilities of LLC «Energy Technology Company «Energoalians» are supplying materials and PDD design, PJSC "Creamgas" supporting during of determination process, Letter of Endorsement and Letter of Approval receiving, consultation of PJSC "Creamgas" during final Project determination too.

A.4. Technical description of the project:

A.4.1. Location of the project:

The Project is located on the territory of the AR Crimea (except for Sevastopol, Feodosiya and Kerch towns), Ukraine. (Fig.1).

Fig.1. The map of Ukraine with indication of placement of AR Crimea region.

A.4.1.1. Host Party (-ies)

The Project is located on the territory of Ukraine.

Ukraine is the country in the East Europe, that ratified Kyoto Protocol to UN Framework Convention as of February 04, 2004, enters the list of countries given in the Annex 1, and meets the requirements for participation in Joint Implementation projects.

A.4.1.2. Region/State/Province and etc.:

The project is located in the AR Crimea (except for Sevastopol, Feodosiya and Kerch towns), Ukraine.

A.4.1.3. City/Town/Community etc.:

AR Crimea, Ukraine: 16 towns, 53 settlements of city type, 780 villages.

A.4.1.4. Details of physical location, including information allowing the unique identification of the project (maximum is one page):

The administrative center of AR Crimea is Simferopol city.
The geographical coordinates of Simferopol is:
Width: 44° 57'N
Longitude: 34° 06'E
Time zone: GMT +2:00

AR Crimea is located in the South of Ukraine, on the Crimea Peninsula. AR Crimea ocuped area 26,9 thousand km^2, representing 4.3% of the territory of Ukraine. The length is from north to south for 207 km and from west to east - on 324 km. Territory of AR Crimea surrounded by Black Sea from the West and by Sea of Azov from the East. Nature landscapes of Crimea Peninsula are notable by diversity. North part taken up by prairie, forest is cover of south area. Three Mountain ridges extend from Sevastopol to Feodosia cities. There are 257 rivers and more than 50 salted likes located on the Crimea.

Complete list and addresses of gas-distributing plants (357 units), cabinet-type gas-distributing plants (1 118 units) and gas armature (14 690 units), that is included into the project boundary, may be found in an Accompanying document 1 - Register of gas-distributing plants and gas armature of Joint Implementation Project "Reduction of Natural Gas Emissions at PJSC «Creamgas»"[2].

[2] Accompanying document 1 is Register of gas-distributing plants and gas armature of Joint Implementation Project "Reduction of Natural Gas Emissions at PJSC «Creamgas»" is executed in an electronic form and submitted to the State Environmental Investment Agency of Ukraine and project inspectorate - company Bureau Veritas Certification Holding SAS.

A.4.2. Technology (-ies) to be employed, or measures, operations or actions to be implemented by the project:

1. Development and introduction of method of methane emissions measuring

The measurement of methane leakage volumes uses JI Specific Approach based on technology of "calibrated bag" that is described in the approved CDM methodology AM0023 version 4.0 "Leak detection and repair in gas production, processing, transmission, storage and distribution systems and in refinery facilities"[3]. One of the problems of the use of this methodology is difficulty of armature volume calculation used for measuring, and also the initial volume of air, at determination of gas volume that entered the "bag".

To solve these problems a special setting was made on the base of plastic tank with the known volume (0,11 m^3), a package, plastic hose and manometer (see Annex 3, Fig. 1). All connections are executed hermetically. Photo of the device for methane emissions measuring is given on Fig. 2.

Fig 2. Photo device for quantitative measuring of methane emissions

Gas analyzer Ex-Tec® HS 660. For determination of methane concentration in the tank a high-fidelity gas analyzer Ex-Tec® HS 660 is used, photo of which is given on Fig.3.

[3] Leak detection and repair in gas production, processing, transmission, storage and distribution systems and in refinery facilities", version 4.0

Fig.3. Photo of the gas analyzer of Ex-Tec® HS 660

Gas analyzer has the following characteristics:
- explosion-proof (CENELEC).
  calibration: Methane CH_4 / natural gas, propane C_3H_8;
- methane detection upon control of pipeline networks (ppm range);
- gas detection at the internal installations (ppm range);
- alarm when approaching the lower explosion limit (%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[4].

After an exposure and emission measuring repair or replacement of gas equipment GDP (CGDP) and gas armature of gas pipelines is executed with the use of modern materials of sealers (GOST 7338-90[5], GOST 5152-84[6] or GOST 10330-76[7]).

Detailed information on the measuring methods used in leakage monitoring is given in the Annex 3.

2. Introduction of modern sealers for liquidation of emissions

Sealers (sealing agents) GOST 7338-90 are oil-and-petrol-resistant plates used for making of rubber-technical wares, that serve for the compression of immobile connections, prevention of friction between metallic surfaces, for perception of the single shock loadings, and also as gaskets, flooring and other sealing wares.

[4] Electrical apparatus for the detection and measurement of combustible gases). General requirements and test methods.
[5] Standard "Rubber and Rubber-fabric Planes"
[6] Standard "Sealing Stuffing"
[7] Standard "Flax dishevelled. Specifications"

Greasing of locking devices and compression of the threaded connections by a fibre of flax GOST 10330-76 and by oil Plitol-M (TU U 25404313.004-2201)

Sealing stuffing GOST 5152-84 Asbestine wattled sealing stuffing is used for the compression of sealing of stuffing chambers of armature, centrifugal and piston pumps, and also different devices at working temperatures from - 70 to 300˚C.

Wattled sealing stuffing is the most widespread type of sealing materials, used to seal stuffing-boxes of armature chambers, centrifugal and piston pumps, different vehicles used for filling. This stuffing is used to complete more than 80% of armature. They differentiate both in materials they are made of and methods of making (by a structure). Both factors substantially influence operating properties of stuffing. The important components of stuffing are different types of impregnations and fillers that give necessary properties to them.

3. Replacement of locking-regulating armature

Locking - regulating armature. Within the framework of the Project it is planned also to conduct replacement of old gas equipment GDP (CGDP) and locking-regulating armature of the USSR production, by the armature of the European producers and their analogues of home production

4. Installation of centralized natural gas accounting system

During realization of the Project the used for prevention of methane emissions gas equipment can be changed depending on the market entry by more modern and perfect technologies and another producers' equipment.

The choice of devices and materials will depend on the size, source of emissions and system components working schedule, on which this emission was found by the use of modern PETM of gas-distributing networks, including:

- investigation of basic conditions – upon using measuring devices described above;
- registration of results and determination of priority in elimination of leaks, which ensures the highest efficiency of this work upon scarcity of repair means.
- data analysis and evaluation of natural gas leaks and volumes of emission reduction.
- development of plan of future monitoring of GDP (CGDP) gas equipment, gas armature, threaded and flanged connections of PJSC «Creamgas» gas pipelines, apt to the emissions, and realization of the already eliminated emissions' monitoring too.

Implementation Schedule

1. Drawing of primary register of gas equipment GDP (CGDP), gas armature, threaded and flanged connections of gas pipelines. Organization of the Working group. Methodology of Measurement and Monitoring Plan development. Realization of inspection of gas equipment GDP (CGDP), gas armature, threaded and flanged connections of gas pipelines and primary monitoring measuring. (April-May 2004).
2. Introduction and realization of the program PETM, repair (replacement) of gas equipment 369 GDP (CGDP) and 2 938 units of gas armature (May - December 2004)
3. Introduction and realization of the program PETM, repair (replacement) of gas equipment 516 GDP (CGDP) and 3673 units of gas armature (January - December 2005)
4. Introduction and realization of the program PETM, repair (replacement) of gas equipment 287 GDP (CGDP) and 2 204 units of gas armature (January - December 2006)
5. Introduction and realization of the program PETM, repair (replacement) of gas equipment 63 GDP (CGDP) and 735 units of gas armature (January - December 2007)

6. Introduction and realization of the program PETM, repair (replacement) of gas equipment 54 GDP (CGDP) and 1 469 units of gas armature (January - December 2008)
7. Introduction and realization of the program PETM, repair (replacement) of gas equipment 75 GDP (CGDP) and 1 469 units of gas armature (January - December 2009)
8. Introduction and realization of the program PETM, repair (replacement) of gas equipment 30 GDP (CGDP) and 735 units of gas armature (January - December 2010)
9. Introduction and realization of the program PETM, repair (replacement) of gas equipment 62 GDP (CGDP) and 735 units of gas armature (January - December 2011)
10. Continued introduction and realization of the program PETM, repair (replacement) of gas equipment 21 GDP (CGDP) and 735 units of gas armature , regular monitoring observations and measurements of repaired gas equipment GDP (CGDP) and gas pipeline valves, elimination of leaks in equipment that has been repaired, if there are sources (January 2012 - December 2017).

A.4.3. Brief explanation of how the anthropogenic emissions of greenhouse gases by sources are to be reduced by the proposed JI project, including why the emission reductions would not occur in the absence of the proposed project, taking into account national and/or sectoral policies and circumstances:

Project activity includes:

- repair (replacement) of gas equipment GDP (CGDP), gas armature, pressurizing of the threaded and flanged connections of gas pipelines of PJSC «Creamgas» with the using of modern equipment of the European producers and their analogues of domestic productions, by the using of modern sealing materials;
- monitoring of emissions aimed at the exposure of methane emissions through the non-tightness;
- next renewal of tightness of gas equipment GDP (CGDP), gas armature, threaded and flanged connections of gas pipelines.

Reduction of natural gas emissions will result in reduction of methane that is greenhouse gas.

Absence of the Project activity means that all equipment, including the old, but yet capable of working with less leak-proof than it is foreseen by the project activity, will be long time exploited in the ordinary mode that makes impossible the methane emissions reduction.

A.4.3.1. Estimated amount of emission reductions over the crediting period:

During the Project implementation following emission reductions will be achieved at each stage of the Project:

Table 1. Estimated amount of CO_2 e. reduction. (2004-2007)

	Years
Length of crediting period	4
Years	**Estimate of annual emission reductions in tons of CO_2 equivalent**
2004	98 919
2005	293 225
2006	455 736
2007	533 459
Total estimated emission reductions over the crediting period 2004 – 2007 (tCO2-equv.)	**1 381 339**
Annual average of estimated emission reductions	345 335

over the crediting period (in tons of CO_2 equivalent)	

Table 2. Estimated amount of CO_2 e. reduction. (2008-2012)

	Years
Length of the crediting period	5
Years	**Expected annual emission reductions in tons of CO_2 equivalent**
2008	600 582
2009	685 370
2010	745 428
2011	787 823
2012	830 217
Total estimated emission reductions over the crediting period 2008 – 2012 (tCO2-equv.)	**3 649 420**
Annual average of estimated emission reductions over the crediting period (in tons of CO_2 equivalent)	729 884

Table 3. Estimated amount of tCO_2 e. reduction. (2013-2017)

	Years
Length of the crediting period under post-Kyoto Mechanism	5
Years	**Expected annual emission reductions in tons CO_2 equivalent**
2013	847 881
2014	847 881
2015	847 881
2016	847 881
2017	847 881
Total estimated emission reductions over the crediting period 2013 - 2017 (tCO2-equv.)	**4 239 405**
Annual average of estimated emission reductions over the crediting period (in tons CO_2 equivalent)	847 881

A description of formula used for emission reduction calculation is given in the paragraph D.1.4.

Functioning of the emissions exposure and removal system, and also further support of tightness of GDP (CGDP) gas equipment, gas armature, threaded and flanged connections of PJSC «Creamgas» gas pipelines, that is created within the framework of Project, does not have limitations on duration. Therefore Project will give reduction of methane emissions after completion the period of crediting.

A.5. Project approval by the Parties involved:

The Project is already supported by the representative office of Government of Ukraine, namely by State Environmental Investment Agency of Ukraine, which has issued the Letter of Endorsement for the JI Project № 2133/23/7 of 06/08/2012.

On receipt of Determination Report from the Accredited Independent Entity Project documentation will be presented to the State Environmental Investment Agency of Ukraine for the obtaining of the Letter of Approval.

SECTION B. Baseline

B.1. Description and justification of the baseline chosen:

1. Baseline determination approach.

Baseline setting (measurement and calculation of natural gas leaks) has been done using JI JI Specific Approach on the basis of the approved methodology of Clean Development Mechanism AM0023 version 4.0 "Leak detection and repair in gas production, processing, transmission, storage and distribution systems and in refinery facilities'. The modification of methodology AM0023 version 4.0 is caused by application of more exact method of measuring of methane leakages.

Baseline was chosen according to the requirements of "Guidance on criteria for baseline setting and monitoring", version 03, according to Guidance for users of Project Design Document forms for Joint Implementation projects, version 04.

Methodology AM0023 version 4.0 is applicable for the projects wich concern of natural gas emissions reduction on the compressor, gas-distributing stations on the gas pipelines, as well as for the gas-distributing systems' equipment.

Conventional activity existed at PJSC "Creamgas" before the Project implementation met the requirements of Ukrainian Gas Supply System Safety Rules and included leakage detection by means of gas detectors, which fixed only presence or absence of natural gas leakages in order to avoid emergency and explosive situations.

In the course of Project relization PETM program concerning GDP (CGDP) gas equipment and gas armature of PJSC "Creamgas"gas-distribution networks, as it described in paragraph "Project scenario" of section A.2 of PDD, in substance, is corresponded to the methodology AM0023 version 4.0 requirements.

For use of proposed JI Specific Approach for baseline determination the following three conditions shall be satisfied:

1. Companies - operators of gas-distributing networks at the moment of project implementation do not use advanced activities that allows systematic detection and elimination of methane emissions;
2. The losses (emissions) of methane can be detected and exactly measured;
3. Monitoring system can be implemented to make sure eliminated methane leaks will not occur again.

The Project fully complies with the second and the third conditions, and with the first condition subject to some notes given below.

In relation to the *first condition,* before the beginning of the project PJSC «Creamgas» provided only the exposure of emissions by means of gas detectors in accordance with Ukrainian Gas Supply Systems Safety Rules in order to avoid emergency and explosive situations. The measurements of the emissions volumes, their registration and accounting were not done, and appropriate measuring devices were absent. The theoretical calculations of emission volumes, on the basis of the executed initial measurements, amounts about 65 million m^3 per year.

But foregoing measures do not give understanding of the real volumes of emissions mainly through the use of old equipment and worn out sealing materials. The Project does not foresee more frequent checks of gas equipment, but foresees the use of modern sealing material, replacement of old gas equipment by

the new, modern equipment of European production, their analogues of home producers and implementation of the monitoring measuring of methane emissions volumes.

According to international experience and the data received from the national projects, where new sealing materials and gas equipment were used, it can be said that their use considerably reduced the volumes of methane emissions.

Moreover, due to the lack of mechanisms in national legislation for operators' encouragement of natural gas leakage reduction, effective program for detection and elimination of methane leakages could not be applied without project activities. The operators which were mainly motivated by the safety conditions could only detect the fact of leakage, but could not measure its volume.

In other words, we want to emphasize that practice that existed in PJSC "Creamgas" before the beginning of this Project implementation was not able to remove the leakages included into this Project.

In relation to *the second condition*. The purchase of modern equipment on detection and measurement of volumes of methane emissions and direct measuring of emission volume on the gas equipment GDP (CGDP) and gas armature demonstrated that when applying modern practices and gas equipment the emissions may not only be detected and eliminated but also exactly measured.

In relation to the *third condition.* Introduction of step-by-step procedures, creation of database and application of system approach will allow conducting the reliable monitoring of the repaired GDP (CGDP) gas equipment and gas pipelines armature and find out the repeated emissions, if they take place (see Annex 3). The studies of personnel at sites and introduction of quality control on all stages of project activity will allow to realize the Monitoring Plan.

2. Application of selected approach in baseline determination

Initial conditions

Only two options of initial terms can be examined as possible and reliable alternatives for the Project:

1. Keeping the current system for detection and elimination of leaks – business as usual alternative;
2. Implementation of this Project not as a JI project.

Arguments are presented in this PDD (see section B.2) prove that maintenance of the existing practice on exposure and elimination of emissions is the most credible scenario for development in condition of the Project absence.

Therefore, this scenario can be accepted as the Initial conditions.

Emission Reductions

The method for determination of emissions volumes is similar to the method described in the Methodology AM0023 version 4.0 consist of preliminary estimation of emissions with next determination of their actual volume.

In accordance with Methodology AM0023 version 4.0, the level of emission reductions is determined in the following order:

1. Current practice of exposure and removal of losses of natural gas are estimated and described.

2. The clear and transparent criteria of determination are set, if methane emissions exposure and removal will be conducted upon the conditions of absence of this Project.
3. The terms of replacement of equipment are determined on condition of absence of this Project.
4. During realization of the Project the data about emissions are gathered.
5. Efficiency of repair is checked up during monitoring.
6. Based on the collected during the previous steps data the actual methane emissions volume is calculated.

These steps are below described for this Project.

Step 1. Estimation and description of current practice of exposure and removal of extras

Methodology AM0023 version 4.0 stipulates that during the calculation of emissions volumes reduction only those types of emissions are taken into account which do not appear and are not removed in accordance with the used at this time in practice. The Project used JI Specific Approach based on the methodology AM0023, version 4.0. The difference of the JI Specific Approach from methodology AM0023, version 4.0, is the methodology of measuring the volume of methane. Methodology of methane emissions volumes measuring that is used in this Project is presented in Step 3 below and Annex 3 to this PDD.

Before the beginning of the Project PJSC "Creamgas" only detected leakages with the help of gas detectors according to the Ukrainian Gas Supply System Safety Rules[8] in order to avoid emergency and explosive situations. Measurement of the leakage volume, its registration and accounting were not performed.

Before Project implementation PJSC "Creamgas" didn't take measures on direct inspection and maintenance beyond the scope of requirements established by the safety rules. Traditional material used in the course of repair works provided only temporary elimination of methane leakages, while approach provided by the Project ensures reliable elimination of methane leakages for a long term.

GDP (CGDP) gas equipment of, gas armature, the flanged, threaded joints of gas pipelines included in the project boundaries will be examined, repaired or substituted, without regard that they are regularly inspected and repaired within existent system of service. Repair and replacement under the Project will be performed with the use of modern equipment of the European production, their analogues of domestic manufacturing, and new sealing materials, not taking into account whether the leak has been detected or not, in order to prevent leaks in future.

Step 2. Terms for equipment replacement

Beginning from May 2004 at the exposure of methane emissions repair or replacement of GDP (CGDP) gas equipment, gas armature of gas pipelines is executed with the use of modern equipment and materials, in accordance with project activity.

Inclusion (into calculation of methane emission reductions) of any similar cases of potential replacement of components with application of materials and equipment that were used in the project practice is beside the purpose, since there is no substantial influence on the result of the Project, i.e. on the level of reduction of methane emissions.

[8] The Order of The State Committee of Ukraine on supervision of a labor safety Nr. 254 on 01/10/1997, registered in the Ministry of Justice of Ukraine Nr. 318/2758 on 15/05/1998.

Here it is also important to indicate that within this Project all GDP (CGDP) gas equipment, gas armature, flanged and threaded joints of gas pipelines will be repaired or replaced, even if emissions are found only on part of them.

Step 3. Data collection during project implementation

Collection of data on these volumes of methane emissions is conducted together with realization of repairs (replacements) of gas equipment of this Project. Exposure of natural gas emissions is executed by means of gas analyzers that operate on the basis of catalytic oxidization/heat-conducting. Repair works (replacement of equipment) are conducted after measuring of volumes of methane emissions were carried out. For measuring of volumes methane emissions (in composition of the natural gas) the methodology worked out by Moston Properties Limited company in 2004 is used. Methodology is based on usage of a device in composition of a leakage-proof tank of the known volume, gas analyzers EX-TEC® HS 660 (EX-TEC® HS 680 or Variotec 8-EX), plastic package and connecting hoses (see Annex 3).

On its principle the methodology of Moston Properties Limited company is the most close to the method of the "Calibrated bag" that was applied in methodology AM0023 version 4.0.

But the methodology of Moston Properties Limited company has no thouse defects wich are present in the “Calibrated bag”, namely:

- Use of insulated bag does not allow making precise measurement because of very difficult determination of initial volume of the let-out bag;
- Use of the package (bag) does not allow permanent control of methane concentration in it, which can result in creation of combustible mix of methane and air, working with which is hazardous even when using antistatic bag;
- Use of package (bag) does not allow precise measuring of background concentration of methane in package (bag).

After realization of repair (replacements) of gas equipment the new measuring is executed, to make sure in the removal of methane emissions.
The data collected are included into the reports on fulfilling the monitoring plan. All data are kept in a database. Every report on fulfilling the monitoring plan will include complete information from PJSC “Creamgas” database (Annex 3 to this PDD).

Step 4. Requirements to procedures of monitoring

At Step 4 during Project supervision of Project object is conducted for verification of the repeated methane emissions. The Monitoring Plan for this Project refers to all repaired (replaced) gas equipment of GDP (CGDP), gas armature, flanged and the threaded connections of gas pipelines. Frequency of actions in relation to exposure and measuring of emissions, where they were already removed, is specified in the Monitoring Plan.

For gas equipment, where the volume of methane leaks detected again, not exceed the volume of leakage, measured after the first repair (replacement) equipment, sources of methane from such equipment will be equal to the volume of leakage, measured after the first repair (replacement) for the entire period since the last inspection / monitoring.

For gas equipment, where the repeated methane leakage are found, volume of which is more than the volume of methane leakage, measured after the first repair (replacements), such equipment will be excluded from the calculations of reduction of methane emissions for corresponding monitoring period,

then it will be considered that on this equipment there was no reduction of methane emissions during this period from the date of the last monitoring of methane emissions measuring. Such position corresponds to the requirements of methodology AM0023 version 4.0. Such equipment will be repaired (or replaced) repeatedly after which measuring of methane emissions will be again done whereupon.

The monitoring measuring of methane emissions is conducted with the use of measuring equipment, exactness of measuring of which is not worse than exactness of measuring equipment, which was used to measure methane emissions during the preliminary research.

The collected data will be included into the regular reports on fulfilling of the monitoring plan. All data are kept in a database. Every report on fulfilling the monitoring plan will include complete information from PJSC "Creamgas" database (Annex 3 to this PDD).

Step 5. Calculation of methane emission reduction

The reduction of methane emissions, obtained as a result of realization of the Project, is defined as the difference between the emissions measured before realization of repair (Step 3), and after repair (Step 4). In case that emission after repair will be more than the measured before the repair, for the corresponding component there will be negative reduction of methane emissions. Otherwise speaking, the used methodology foresees a case, in which the emissions of methane during implementation of the Project exceed emissions indicated by certain initial terms.

Description of baseline and explanation of its choice are presented in the section B.2. below.

Key information for determination of the baseline is presented in Table 4 below.

Table 4. Key information for the baseline determination.

Data/Parameter	i
Measurement unit	Dimensionless
Description	Sequence number of GDP (CGDP), gas equipment, gas pipeline armature of where methane emissions were found
Periodicity of measurement/monitoring	One time at the beginning of Project
The source of data applied/to be applied	Activity of emissions measuring
Data values (for ex-ante calculations/measurements)	-
Confirmation of data selection, or description of the measurement method and procedures applied/to be applied	Methodology AM0023 version 4.0
Measurement quality management/quality assurance procedures applied/to be applied	Personnel will have corresponding qualification for fixing of results.
Comments	List of gas equipment GDP (CGDP), gas armature, flanged, threaded connections is presented in the Accompanying document 1.

Data/Parameter	Ti
Measurement unit	hours
Description	The amount of hours of exploitation of equipment on which emissions were found during a year

Periodicity of measurement/monitoring	Constantly
The source of data applied/to be applied	Records of results of inspections
Data values (for ex-ante calculations/measurements)	-
Confirmation of data selection, or description of the measurement method and procedures applied/to be applied	Methodology AM0023, version 4.0
Measurement quality management/quality assurance procedures applied/to be applied	Personnel will have corresponding qualification for fixing of results.
Comments	Amount of hours of exploitation of equipment during a year from the moment of its repair (replacements)

Data/Parameter	GWP_{CH4},
Measurement unit	tCO_2e / tCH_4
Description	Global Warming Potential for methane
Periodicity of measurement/monitoring	Permanent
The source of data applied/to be applied	IPCC
Data values (for ex-ante calculations/measurements)	21
Confirmation of data selection, or description of the measurement method and procedures applied/to be applied	-
Measurement quality management/quality assurance procedures applied/to be applied	The person responsible for monitoring verifies the data on an annual basis
Comments	Project designer will perform monitoring of any changes in the Global Warming Potential for methane, published by IPCC **(**IPCC Second Assessment Report: Climate Change 1995 (SAR)) and approved by COP. The value of GWP for methane is provided on the UNFCCC web-site: http://unfccc.int/ghg_data/items/3825.php

Data/Parameter	$F_{CH4,i}$
Measurement unit	m^3 CH_4/hr
Description	Methane leakage rate for each detected leakage (formula (4), PDD)
Periodicity of measurement/monitoring	Before repair and after repair/Annually
The source of data applied/to be applied	Calculation
Data values (for ex-ante calculations/measurements)	-
Confirmation of data selection, or description of the measurement method and procedures applied/to be applied	Calculation according to the Methodology AM0023 version 4.0
Measurement quality management/quality assurance procedures applied/to be applied	Equipment has been calibrated and verified according to the quality management (D.2. of PDD) and measurement quality (see Monitoring Plan) procedures. Regular maintenance is done according to the technical specifications.

Comments	-

Data/Parameter	t_i
Measurement unit	^0C
Description	Gas temperature
Periodicity of measurement/monitoring	Permanent / Periodical
The source of data applied/to be applied	Mercury glass thermometer of type TL-4 or other types, wich are corresponding whith GOST 8.279[9]
Data values (for ex-ante calculations/measurements)	-
Confirmation of data selection, or description of the measurement method and procedures applied/to be applied	Methodology AM0023 version 4.0
Measurement quality management/quality assurance procedures applied/to be applied	Equipment has been calibrated and verified according to the quality measurement procedures. Regular maintenance is done according to the technical specifications.
Comments	Measured for determination of CH4 density.

Data/Parameter	P_i
Measurement unit	MPa
Description	Gas pressure
Periodicity of measurement/monitoring	Constantly / Periodical
The source of data applied/to be applied	Barometer BAMM-1 or M-67 or other types, wich are corresponding whith ТУ 25-04-1797-75[10]
Data values (for ex-ante calculations/measurements)	-
Confirmation of data selection, or description of the measurement method and procedures applied/to be applied	Methodology AM0023 version 4.0
Measurement quality management/quality assurance procedures applied/to be applied	Equipment is calibrated and tested in accordance with the measurement quality procedures. Current service is conducted in accordance with technical specifications.
Comments	Measured for determination of CH4 density.

Data/Parameter	*Vbag*
Measurement unit	m^3
Description	Reservoir capacity
Periodicity of measurement/monitoring	Once, in the beginning of the Project
The source of data applied/to be applied	Reservoir measuring report, April 23, 2004.
Data values (for ex-ante calculations/measurements)	0.11 m^3
Confirmation of data selection, or description of the measurement method and procedures applied/to be applied	Methodology AM0023 version 4.0
Measurement quality management/quality assurance	Equipment has been calibrated and verified according to the measurement quality procedures. Regular maintenance

[9] Standart “Glass, liquid, workers Thermometers.Methods and checking means”

[10] «Barometre aneroid control. Total Technical conditions»

procedures applied/to be applied	is done according to the technical specifications.
Comments	Reservoir is filled in with water. Amount of water measured by flow meter will be reservoir capacity Measurement showed that reservoir capacity is 0.11 m^3.

Data/Parameter	$w_{sampleCH4,i}$
Measurement unit	%
Description	Methane concentration in the sample
Periodicity of measurement/monitoring	Periodically
The source of data applied/to be applied	Gas analyzers EX-TEC® HS 660 (EX-TEC®HS680 or Variotec 8-EX)
Data values (for ex-ante calculations/measurements)	-
Confirmation of data selection, or description of the measurement method and procedures applied/to be applied	Methodology AM0023 version 4.0
Measurement quality management/quality assurance procedures applied/to be applied	Equipment is calibrated and tested in accordance with the measurement quality procedures. Current service is conducted in accordance with technical specifications.
Comments	Concentration of methane emissions in the tank is the difference between the concentration of methane in a tank at the beginning and in the end of measuring. The concentration is measured by means of gas analyzers EX - TEC® HS 660 (EX - TEC® HS680 or Variotec 8-EX).

Data/Parameter	τ_i
Measurement unit	second
Description	Time during which methane concentration reaches a stable level
Periodicity of measurement/monitoring	Periodically
The source of data applied/to be applied	Seconds measuring device «SOS pr-2b-2» type or other tipes, wich are corresponding with GOST 5072-72[11]
Data values (for ex-ante calculations/measurements)	-
Confirmation of data selection, or description of the measurement method and procedures applied/to be applied	Methodology AM0023 version 4.0
Measurement quality management/quality assurance procedures applied/to be applied	Equipment is calibrated and tested in accordance with the measurement quality procedures. Current service is conducted in accordance with technical specifications.
Comments	-

Data/Parameter	URi
Measurement unit	%
Description	Uncertainty range for the flow rate measurement method

[11] «Mechanical seconds measuring devices»

	applied to physical leak *i*
Periodicity of measurement/monitoring	Annually
The source of data applied/to be applied	IPCC
Data values (for ex-ante calculations/measurements)	95
Confirmation of data selection, or description of the measurement method and procedures applied/to be applied	Methodology of AM0023 version 4.0
Measurement quality management/quality assurance procedures applied/to be applied	The responsible for monitoring person checks the data annually
Comments	Estimated where possible, 95% confidence interval, advice of IPCC presented in division 6 of *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories, 2000*. If the producer of equipment of emissions measuring declares the area of uncertainty without clarification of confidence interval, it can be accepted 95%

B.2. Description of how anthropogenic emissions of greenhouse gases by the sources are reduced below those that would have occurred in the absence of the JI project:

1. Approach to demonstration of the fact that the Project generates emissions reductions from the sources being additional to those which would exist in case of its absence

Methodology AM0023 version 4.0, and also the last release "Tool for the demonstration and assessment of additionality " ver. 06.0.0[12], ratified by CDM Executive Board, used for the proving the additionality of this Project.

This approach can be applied for this Project, because it was worked out exactly for the projects of such type. The account of local terms and legislation will allow to estimate its additionality objectively.

2. Application of the selected approach. Proofs of the Project additionality

Step 1- Identification of alternatives for the Project activity consistent with current Ukrainian laws and regulations.

Sub-Step 1b: Define alternatives to the Project *activity:*

Only two options of initial terms can be examined as acceptable to Project:

Option 1: The continuation of the current situation;

Option 2: Measures foreseen by Project will be carried out without the use of the mechanism set by the article 6 of Kyoto protocol of UN Framework Convention On Climate Change.

[12] "Tool for the demonstration and assessment of additionality" (Version 06.0.0): http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v6.0.0.pdf

Option 1: Continuation of the current situation of exposure and removal of natural gas losses, AND accordingly, of methane emissions is the most realistic and reliable alternative of the Project realization, because it does not require additional investment from PJSC «Creamgas».

PJSC «Creamgas» does not receive any financial profit from methane emission reduction. The existing in Ukraine system of tariffs forming on natural gas stipulates the decline of tariff on natural gas in case of reduction of its losses. The set at this time payment for the emissions of methane within the fixed limits is difficult to charge in connection with absence of measuring technologies and by the greater amount of the insignificant emissions spread on large territory.

Option 2: According to the Methodology AM0023 version 4.0, to determine the probably variant of initial conditions it is necessary to determine if similar efforts have been made or are expected to be made to reduce methane leaks from equipment, using similarly capable leak detection and measurement technology as described in this methodology.

PJSC «Creamgas» before the beginning of the Project realization did not conduct measures in relation to direct inspection and technical maintenance that would go beyond the scope of the requirements of safety precautions set by norms.

The type and volumes of technological losses in the Ukrainian gas-distributing networks were mainly unknown to the moment of realization of the first direct inspections and prophylactic reviews, carried out for the estimation of marketabilities of projects within the framework of the mechanisms set by the article 6 of Kyoto protocol up to Scope convention of UNO about the change of climate. Estimations of clean volume of gas consumption and its losses were approximate.

Moreover, PJSC «Creamgas» before the beginning of realization of the Project had neither stimuli nor resources for realization of the measures foreseen by the Project, in absence of its support by the mechanisms set by the article 6 of Kyoto Protocol to UN Framework Convention On Climate Change.
The Project stipulates additional charges on measuring devices, on the new gas equipment of the European producers and their analogues of home production, on modern sealing materials and studies of personnel.

To carry such charges for realization of this Project or analogical measures financial stimuli are absent for PJSC "Creamgas", except possible receivables, that can be obtained within the framework of the mechanism set by the article 6 of Kyoto Protocol to UN Framework Convention On Climate Change.

Outcome of Step 1a: PJSC «Creamgas» will not provide investments for implementation of the Option 2. Therefore, the most real and reliable alternative is Option 1.

Sub-Step 1b: Consistency with mandatory Ukrainian laws and regulations

Option 1: Current practice of exposure and removal of natural gas losses and accordingly, emissions of methane corresponds to the current legislation of Ukraine. The legislation assumes the losses of natural gas, and, accordingly, emissions of methane at transporting of natural gas. Norms set periodicity which the gas-distributing organizations must execute verifications of equipment with the aim of exposure of losses of natural gas only. Practice of exposure of losses of natural gas in PJSC «Creamgas» corresponds to the indicated norms. Control of observance of norms if performed by implementation of annual revisions by the authorized bodies.

The Project also conforms to the existing legislative requirements in Ukraine concerning detection of natural gas leakage and methane emission at gas distribution objects, and to any other currently applicable legislative norms.

The program of PJSC «Creamgas» for regular detection of natural gas leakage will be realized parallel to application of more up-to-date methods of detection and measurement of natural gas leakage, and therefore, methane emissions, and the activities for long-term elimination of natural gas leakage, and therefore, methane emissions, provided for by this Project.

Outcome of Step 1b: The selected realistic conservative variant deserving trust (Option 1) fully correspondents to obligatory requirements and norms of the Ukrainian legislation.

Step 2 – Investment Analysis

Since the "Tool for demonstration and assessment of additionality " version 06.0.0 provides choice to hold or investment analysis or barrier analysis, exactly the analysis of barriers was chosen to demonstrate the principle of subsidiary.

Step 3 – Barrier Analysis

Sub-step 3a - Identify barriers that would prevent the implementation of the proposed JI Project *activity:*

For PJSC «Creamgas» the Project is the first project of such type, and in this connection a few types of barriers took place at the beginning of realization of the Project. PJSC «Creamgas» ran into serious financial barriers, and also with insufficient experience on the use of new approaches and measuring devices for an exposure and removal of gas missions on its objects, including:

- Organizational barrier.

Insufficient potential of labor and technical resources of PJSC «Creamgas» for JI Project implementation and carrying out, project documentation design specifically. It is connected with the absence of qualified personnel: during the last years the company faced significant outflow of qualified personnel, and newly recruited employees do not have enough experience and knowledge yet.

- Absence of special technical knowledge.

At the moment of Project beginning available qualified personnel did not have experience in using equipment and methods for measuring gas leak volumes: gas detectors used by PJSC «Creamgas» ensures only detection of leaks, and volume of leaks is not measured and fixed. Therefore, Project implementation requires time to gain practical experience in measurement of natural gas leak volumes.

- Financial barrier.

Realization of Project requires charges additional to the existent charges on realization of measures in relation to exposure and removal of natural gas emissions, and, accordingly methane emissions.

Additional charges on realization of the Project include charges on:

- purchase and use of modern measuring devices for exposure and measuring of emissions of methane gas analyzer EX - TEC® HS 660 or EX - TEC®HS680, or Variotec 8-EX;
- purchase and installation of sealing materials;
- substituting of out-of-date standards of gas equipment of GDP (CGDP) and locking-regulating armature by the new gas equipment of the European producers;

- studies of personnel, realization of direct prophylactic review and technical service;
- systematic collection of data and their management;
- systematic and long-term control of found out natural gas losses removal.

During realization of the project modern sealing material is used. In accordance with the previous results of researches, the sealing materials are concordant with GOST 7338-90, GOST 10330-76 and GOST 5152-84 and are far more effective, but at the same time more expensive than sealing materials that are used in current practice. In existent practice of PJSC "Creamgas" does not extract an additional benefit in case of reduction of natural gas emissions. Thus, for PJSC «Creamgas» there are no stimuli for purchase and use of more expensive sealing material.

In the beginning of the Project on networks of PJSC «Creamgas» old gas equipment GDP (CGDP) and locking-regulating armature of the USSR production were used mostly, that considerably yield to in impermeability the new standards of the European producers, are threadbare, but considerably cheaper. In connection with it, setting of new gas equipment in the gas pipelines of the European producers and their analogues of home production could not prevail.

Application of mechanisms of JI projects to this Project does these measures economically advantageous and is the only way of their introduction.

Outcome of Step 3a: It goes out from the all above-mentioned, that this Project is economically not attractive without registration of Project as JI Project, that specifies on additionality of this Project.

Sub-step 3b: Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed Project *activity):*

Financial barriers are related also to the structure of the existent tariffs on transporting and distribution of gas, that is regulated by the state and does not take into account the depreciation and investment necessities of gas-distributing enterprises. The results of such business state is the impossibility of timely implementation of major repairs, providing of equipment exploitation, investing in modernization and development of gas-distributing infrastructure.

PJSC "Creamgas" will get no line of economic profit from reduction of methane emissions that is reached during realization of the Project without the account of receivabless from the sale of units of reductions, as at the existent tariff system all losses of gas in gas pipelines are on end-users of natural gas, that is the less are gas expenditures, the less tariffs are for consumers.

Also, it should be taken into account that in Ukraine methane is not included in the list of ecologically harmful gases and not punished by ecological fines. In connection with it, no sanctions are applied to PJSC "Creamgas" in connection with the sources of methane on gas pipelines and PJSC "Creamgas" gets no financial fee for reduction of natural gas emissions.

Outcome of Step 3b*:* As reduction of methane emissions does not bring economic profit to PJSC "Creamgas" and realization of this Project does not bring economic profit to other participants of the Project, including the declarant of the Project, except that it will appear within the framework of JI Project, a conclusion is made that realization of the Project without the receipt of profits within the framework of the JI Project, is a barrier to the investments.

At the same time, from resulted above the analysis of barriers the conclusion follows that the barriers listed above would not prevent realization only one of two alternatives, namely - Option 1: The continuation of the current situation.

Step 4: Common practice analysis

Sub-step 4a: Analyze other activities similar to the proposed Project *activity:*

The absence of financial stimuli described for Step 2 and barriers described in Step 3 are true not only for PJSC "Creamgas", but they are also typical for other companies operating gas-distribution networks in Ukraine. Therefore existing practice for detection and elimination of methane emissions represented in the variant of source conditions selected for this Project is the common one for Ukraine.

On the whole, almost in all Ukraine the same methods of exposure of losses of natural gas are used, as well as on gas pipelines of PJSC «Creamgas» before beginning of realization of the Project. Sealing materials that are used for reduction of losses also little differentiates in regions. The gas enterprises of Ukraine in major part do not have equipment for measuring of volumes of losses of natural gas. Programs of exposure and removal of losses of natural gas that are used in Ukraine, in major part are aimed at implementation of requirements safety and prevention of accidents.

Sub-step 4b: Discuss any similar Options that are occurring:

Except this Project and other projects, realized within the framework of the mechanism set by the article 6 of Kyoto protocol up to UNFCCC (United Nations Framework Convention on Climate Change), in Ukraine other programs of direct exposure and removal of losses of natural gas will not be realized in gas-distributing networks. The Project foresees the use of modern technologies and equipment for exposure and measuring of losses of natural gas.

The prospects of receipt of financing for Project within the framework of the mechanism set by the article 6 of Kyoto protocol up to UNFCCC allowed its developer to prepare this Project. Thus, it is possible to consider that any actions, analogical to those which are foreseen by this Project, are developed and realized in Ukraine, expecting the receipt of benefit in accordance with the mechanisms set by the article 6 of Kyoto protocol up to UNFCCC.

Outcome: Measures analogical to the measures of this Project, at current time can be conducted only on condition of receipt of predictable profit from realization of the mechanism set by the article 6 of Kyoto protocol up to UNFCCC. Thus, this Project is considered such that satisfies the criterion of additionality.

B.3. Description of how the definition of the project boundary is applied to the project:

There are three types of methane emission sources in the JI Project:

(i) Under the control of the project participants: technological methane emissions during plan repair of gas pipeline;

(ii) Reasonably attributable to the Project: methane emissions on gas fittings of house distribution networks;

(iii) Significant:
- leaks on gas equipment (reducing gears, valves, filters and others like that) of gas-distributing points (cabinet-type gas-distributing points) and
- leaks on gas armature (faucets, bolts and others like that), threaded and flanged connections that are located on gas-distributing networks of PJSC «Creamgas».

Only methane emissions sources type (iii) are including to the JI Project boundary:
- leaks on gas equipment of gas-distributing points (cabinet-type gas-distributing points);
- leaks on gas armature, threaded and flange joints that are located on gas-distributing networks of PJSC «Creamgas».

Complete list of included into the JI Project boundary the gas-distributing plants (357 units), cabinet-type gas-distributing plants (1 118 units) and gas armature (14 690 units), are set in the Accompanying document 1.

Sources of leaks of type (i) - technological leaks of gas at repair of pipes of gas pipelines - are not included in project boundary as PJSC «Creamgas» does not apply the technology which allow not to suppose such leaks.
Sources of leaks of type (ii) - gas leaks in house distributing networks - are not included in the JI Project boundary as first, volumes of such leaks it is much less, than volumes of leaks of sources of type (iii), and secondly, sources of these leaks, as a rule, are in private houses (apartments).

The JI Project boundary for a base and project scenario are outlined by the dotted line on Fig. 4

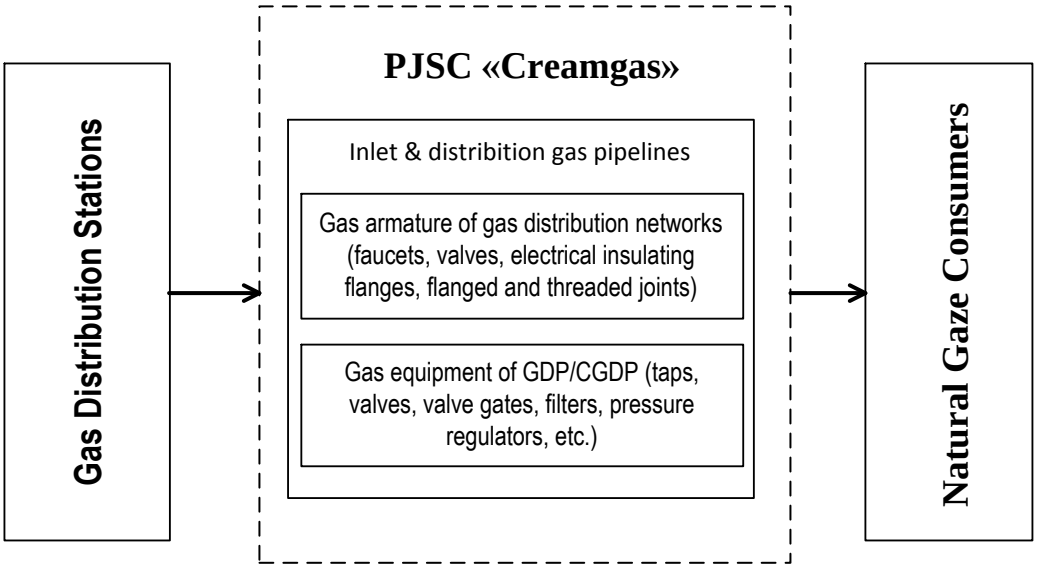

Fig. 4.Project boundary

Geographically GDP (CGDP) and gas pipelines of PJSC «Creamgas» are located in the AR Crimea (except for Sevastopol, Feodosiya and Kerch towns) region, Ukraine.

B.4. Further baseline information, including the date of baseline setting and the name(s) of the person(s)/entity(ies) setting the baseline:

Date of baseline setting: 14/05/2004
Baseline was determined by PJSC «Creamgas» (Ukraine).

PJSC “Creamgas” is Project participant.
PJSC “Creamgas”
95001 Ukraine, AR Crimea, Simferopol, Uchilischna Street, 42a.

phone: +380 (652) 27-10-90
fax: +380(652) 25-55-45
E-mail: gzg@gas.crimea.com
WWW: http://www.gas.crimea.com/
Contact person: Gorobets Zoya Grigorievna

SECTION C. Duration of the project / crediting period

C.1. Starting date of the project:

Project activities starting date: 09/04/2004– date of the Working group organization for JI Project realization on the PJSC «Creamgas» (Order № 216 from April 09, 2004).

C.2. Expected operational lifetime of the project:

Functioning of the system of exposure and removal of emissions, and also further support of leakage-proof of gas equipment that is created within the framework of the Project, does not have limits in duration, as periodic repair (replacement) of gas equipment GDP (CGDP) and gas armature, threaded and flanged connections of gas pipelines will be constantly performed.
Expected operational life cycle of Project in years and months is 13 years and 9 months, or 165 months, from 09/04/2004 to 31/12/2017.

C.3. Length of the crediting period:

The JI Project refers to the first commitment period and presents 5 years/60 months (January 01, 2008 – December 31, 2012).

By the initial date of crediting period taken the date May, 2004 of the first repairs were implemented by Project in PJSC «Creamgas» gas pipelines. The end of the crediting period is 31 December 2012. Crediting period will be 8 years and 8 months or 104 months.

If after the first commitment period according to Kyoto Protocol its action will continue, a crediting period of a Project will continue till December, 31, 2017. The general period of crediting (before the period of crediting, period of crediting and after completion the period of crediting) will amount in 13 years 8 months or 164 months.

SECTION D. Monitoring plan

D.1. Description of monitoring plan chosen:

With the aim of quantitative estimation and preparation of reports on reduction of methane emissions on the basis of baseline and project activity JI Specific Approach on the basis of the approved baseline methodology of CDM AM0023 " Leak detection and repair in gas production, processing, transmission, storage and distribution systems and in refinery facilities", version 4.0 is used with modification (see Section B.1 above) improving correctness of methane leakage volume measurements.

After detection and measuring of methane emissions the monitoring program was worked out for all GDP (CGDP) gas equipment, locking-regulating gas armature, flanged and threaded connections of gas pipelines of PJSC «Creamgas». Implementation of such program is component part of the project activity. Monitoring embraces both emissions from the sources of leakages that appear again and control after the already repaired gas equipment, on which methane emissions were observed before.

Within the framework of JI Project a working group of PJSC «Creamgas» was create the Register of gas-distributing points and gas armature of JI project "Reduction of Natural Gas Emissions on PJSC "Crimeagaz" for the gas equipment of gas-distributing plants and on the gas armature of gas-distributing networks of PJSC «Creamgas» (see the Accompanying document 1), that includes complete information about all GDP (CGDP), locking-regulating gas armature, flanged and threaded joints that are including to the Project boundary. All corresponding data related to the calculation of reduction of methane emissions are kept in an electronic database. Every monitoring report will include all necessary information from this database.

The Project data and documents in a paper and/or electronic kind, in accordance with the PJSC «Creamgas» management's orders of 09/04/2004 № 216 are kept till 31/12/2019.

To determine the baseline the following parameters are used:

№	Parameter reference	Name to the parameter	Data measuring units
1.	i	The sequence number of gas equipment GDP (CGDP), gas armature, where methane emissions are found , removed, and then checked	Dimensionless
2.	Ti	The amount of hours of exploitation of equipment on which emissions were found during a year	Hour
3.	Date	Date of repair (reconstruction)	Month and year
4.	GWP_{CH4}	Global Warming Potential for methane	tCO_2e/tCH_4
5.	$F_{CH4,i}$	Emission rate for each detected leakage	m^3 CH_4/hour
6	t	Temperature	^0C
7	P	Gas pressure	MPa
8.	URi	Uncertainty range for the flow rate measurement method applied to physical leak *i*	%
9.	*Vbag*	Tank capacity	m^3
10.	$w_{sampleCH4,i}$	Methane concentration in a tank	%
11.	τ_i	Time when methane concentration reaches a stable level	second

Types of the data and the parameters used during annual monitoring measurements of methane leaks volumes:

Ty-pe	Properties	Parameter № in the Table 3 PDD	Designation	Name to the parameter	Data measuring units
(i)	Data and parameters that are not monitored throughout the crediting period, but are determined only once (and thus remain fixed throughout the crediting period), and that are available already at the stage of determination	1	i	The sequence number of gas equipment GDP (CGDP), gas armature, where methane emissions are found , removed, and then checked	Dimensionless
		9	V_{bag}	Tank capacity	m^3
(ii)	Data and parameters that are not monitored throughout the crediting period, but are determined only once (and thus remain fixed throughout the crediting period), but that are not already available at the stage of determination	-	-	-	-
(iii)	Data and parameters that are monitored throughout the crediting period	2	Ti	The amount of hours of exploitation of equipment on which emissions were found during a year	Hour
		3.	Date	Date of repair (reconstruction)	Month and year
		4.	GWP_{CH4}	Potential of the global warming for methane	tCO_2e/tCH_4
		5.	$F_{CH4,i}$	Emission speed for each found emission	m^3 CH_4/hour
		6.	t	Gas temperature	^0C
		7.	P	Gas pressure	MPa
		8.	URi	Uncertainty range for the flow rate measurement method applied to physical leak *i*	%
		10.	$w_{sampleCH4,i}$	Methane concentration in a tank	%
		11.	τ_i	Time when methane concentration reaches a stable level	second

D.1.1. Option 1. Monitoring of the emissions in the project scenario and the baseline scenario:

At the moment of the project beginning the unified methodology of methane emissions measuring and monitoring was abcent in Ukraine. Thereforethe the Plan and program of methane emissions monitoring was designed by PJSC «Creamgas». The monitoring plan was worked out on the basis of methodology AM0023 version 4.0 with some assumptions in relation to the method of measuring of methane emissions volume described in point B.1 higher, also more thorough monitoring methodology is described in Annex 3.

D.1.1.1. Data to be collected in order to monitor emissions from the project, and how these data will be archived:

ID number *(Please, use numbers to ease cross-referencing to D.2.)*	**Data variable**	**Source of data**	**Data unit**	**Measured (m), calculated (c) or estimated (e)**	**Recording frequency**	**Proportion of data to be monitored**	**How will the data be archived? (electronic/paper)**	**Comment**
1. i	Number. The sequence number of gas equipment of GDP (CGDP), gas armature, where methane emissions are found , removed, and then checked	Activity on measuring of emissions	Dimensionless	m	Once	100%	Electronic	A corresponding number is appropriated for every emission found on a device. A list of gas equipment is presented in an Accompanying document 1. Verification is conducted after repair.
2. Ti	Time	Records of inspections results	Number of hours of exploitation of its equipment on which emissions were observed during a year	m	Constantly	100%	Electronic	The number of hours of exploitation of equipment for a year from the moment of its replacement (repair)

ID number *(Please, use numbers to ease cross-referencing to D.2.)*	**Data variable**	**Source of data**	**Data unit**	**Measured (m), calculated (c) or estimated (e)**	**Recording frequency**	**Proportion of data to be monitored**	**How will the data be archived? (electronic/paper)**	**Comment**
3. Data	Date	Data on repair (reconstructions) and monitoring (register)	Date of repairs (reconstruction) and monitoring	m	Constantly	100%	Electronic	Month, which was repaired (replacement) equipment. It is used to determine the total number of hours of operation repaired (replaced) equipment in the period of monitoring.
4. GWP_{CH4}	Global Warming Potential for methane	IPCC	tCO_2e / tCH_4	c	Constantly	100%	Electronic	The developer of the project will conduct monitoring of any changes of Global Warming Potential for methane published IPCC and accepted COP
5. $F_{CH4,i}$	Rate of emissions for every found source	Activity on emissions measuring	m^3 CH_4/hour.	c	Before repair and after repair/Annually	100%	Electronic	Calculated with application of the maximum meaning of the measurement error of the device (10% for gas analyzer)
6. t	Temperature	Data of measuring by the mercury glass thermometer of (type TL-4)	^0C	m	Each time while measuring	100%	Electronic	Measured for determination of CH_4 density.
7. P	Gas pressure	Data of measuring by the barometer BAMM-1 or B-67	MPa	m	Each time while measuring	100%	Electronic	Measured for determination of CH_4 density.

ID number *(Please, use numbers to ease cross-referencing to D.2.)*	**Data variable**	**Source of data**	**Data unit**	**Measured (m), calculated (c) or estimated (e)**	**Recording frequency**	**Proportion of data to be monitored**	**How will the data be archived? (electronic/paper)**	**Comment**
8. URi	Uncertainty range for the flow rate measurement method applied to physical leak *i*	Information of producer and/or IPCC GPG	%	m or e	Annually	100%	Electronic	Is estimated where possible, 95% of trust interval, advice of Good Practice Guidance presented in Division 6 2000 IPCC. If a producer of emissions measuring equipment declares the area of uncertainty without clarification of confidence interval, it can be accepted 95%
9. *Vbag*	Tank capacity	Data of measuring of flow meter	$м^3$	m	Once	100%	Electronic / paper	A tank is filled with water. Amount of water that is taken into account by a flow meter will be the tank capacity. Measuring showed that the tank capacity is 0.11 $м^3$.
10. $w_{sampleCH4,i}$	Methane concentration in a sample	Data of measuring of gas analyzer EX - TEC® HS 660, EX - TEC® HS 680 or Variotec 8-EX	%	m	Each time while measuring	100%	Electronic	Concentration of methane in the sample (in a capacity) of emission is the difference between the concentration of methane in a sample at the beginning and in the end of measuring. The concentration is measured by means of gas analyzers EX - TEC® HS 660, EX - TEC® 680 or Variotec 8-EX.

ID number *(Please, use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/paper)	Comment
11. τ_i	Period during which methane concentration in a tank reaches a stable level	Data of measuring of second measuring devices "SOS pr-2б-2"	Seconds	m	Each time while measuring	100%	Electronic	Time during which the concentration of methane in a capacity arrives at a stable level is determined by means of stop-watch. Measuring begins from the moment of opening of faucet on a lid of the tank and is finished at the achievement of concentration of methane in the capacity of stable level.

According to the current legislation, all measuring equipment in Ukraine must satisfy the set norms and corresponding standards and pass periodic verification (one time per year).

D.1.1.2. Description of the formula used for evaluation of project emissions (for each gas, source, CO_2 emission units):

Using the method of measuring of emissions volume by means of leakage-proof tank, the volume of project methane emissions (after repair, replacement) from one gas equipment (armature) is possible to calculate according to the formula:

$$F^{+}_{CH4,i} = Vbag * w_{sampleCH4,i} * 3600 / \tau_i \quad \text{, where} \qquad (1)$$

$F^{+}_{CH4,i}$ - measured rate of Project methane emissions through leaking *i*-equipment and after the repair (replacment) (m^3/hour);
Vbag - leakage-proof tank volume for measuring (m^3);
$w_{sampleCH4,i}$ - methane concentration in the emission sample, which is the difference of concentrations at the beginning and the end of measuring (%);
τ_i - average duration of filling the tank for emission and up to the determined concentration (seconds).

Adjustment of methane emissions speed till normal[13] conditions:
Received as the result of measuring the speed (volume) of methane emissions is adjusted to the normal[13] conditions ($P_н$ = 0,1013 MPa, $T_н$ = 0 °C) as per the formula:

$$F_{CH_4,i,P} = \frac{F^{+}_{CH_4,i} \cdot 273 \cdot P}{0{,}1013 \cdot (273+t)}$$, where (2)

$F_{CH_4,i,P}$ – flow rate of project methane emission (after repair, replacment) for *i*- equipment, adjusted to the normal[13] conditions (m^3/hour);
$F^{+}_{CH4,i}$ - measured speed of project methane emission (after repair, replacment) for *i*- equipment, (m^3/hour);
P – gas pressure in the tank, MPa;
t – temperature of gas in the tank, °C.

Annual project methane emissions (emissions after repair, equipment substitution) are calculated as per the formula:

$Q_{yP} = ConvFactor * \Sigma[F_{CH_4,i,P} * Ti,y * URi] * GWP_{CH4} * 0.9$, where (3)

Q_{yP} - project methane emissions during the period y, for equipment, which was repaired (substituted) (tCO_2e);
ConvFactor - coefficient of transformation m^3CH_4 in tCH_4. Under normal[13] conditions (0 °C and 0.1013 MPa) it equals 0.0007168 tCH_4/m^3CH_4;
$F_{CH_4,i,P}$ – flow rate of project methane emission (after repair, replacment) for *i*- equipment, adjusted to the normal[13] conditions (m^3/hour);
URi - coefficient which takes into account the uncertainty range for the flow rate measurement method applied to physical leak *i* (equals to 95%);
Ti,y - time for *i*-equipment, which functioned during period y (period of monitoring) being repaired (substituted) (hours);
GWP_{CH4} - Global Warming Potential for methane (equals to 21 tCO_2e/tCH_4);
0.9 - coefficient which takes into account the error of measuring devices.

[13] Standard DSTU 4313:2004 "Natural flammable gas. Measuring of consumptions. Terms and definition of notions"

D.1.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions of greenhouse gases by sources within the project boundary, and how such data will be collected and archived:

ID number *(Please, use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/paper)	Comment
1. i	Number. The sequence number of gas equipment of GDP (CGDP), gas armature, where methane emissions are found , removed, and then checked	Measured data of emissions	Dimensionless	m	Once	100%	Electronic	A corresponding number is appropriated for every emission found on a device. A list of gas equipment is presented in an accompanying document 1. Verification is conducted after repair.
2. Ti	Time	Records of inspections results	Number of hours of exploitation of its equipment on which emissions were observed during a year	m	Constantly	100%	Electronic	The number of hours of exploitation of equipment for a year from the moment of its replacement (repair)
3. Data	Date	Date on repair (reconstructions) and monitoring (register)	Date of repairs (reconstruction) and monitoring	m	Constantly	100%	Electronic	Month, which was repaired (replacement) equipment. It is used to determine the total number of hours of operation repaired (replaced) equipment in the period of monitoring.

ID number *(Please, use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/paper)	Comment
4. GWP_{CH4}	Global Warming Potential for methane	IPCC	tCO_2e / tCH_4	c	Constantly	100%	Electronic	The developer of the project will conduct monitoring of any changes of Global Warming Potential for methane published IPCC and accepted COP
5. $F_{CH4,i}$	Rate of emissions for every found source	Measured date of emissions	m^3 CH_4/hour.	c	Annually	100%	Electronic	Calculated with application of the maximum meaning of the measurement error of the device (10% for gas analyzer)
6. t	Temperature	Data of measuring by the mercury glass thermometer (type TL-4)	^0C	m	Each time while measuring	100%	Electronic	Measured for determination of CH_4 density.
7. P	Gas pressure	Data of measuring by the Barometer (BAMM-1 or M-67)	MPa	m	Each time while measuring	100%	Electronic	Measured for determination of CH_4 density.
8. URi	Uncertainty range for the flow rate measurement method applied to physical leak *i*	Information of producer and/or IPCC GPG	%	m or e	Annually	100%	Electronic	Is estimated where possible, 95% of trust interval, advice of Good Practice Guidance presented in Division 6 2000 IPCC. If a producer of emissions measuring equipment declares the area of uncertainty without clarification of confidence interval, it can be accepted 95%

ID number *(Please, use numbers to ease cross-referencing to D.2.)*	**Data variable**	**Source of data**	**Data unit**	**Measured (m), calculated (c) or estimated (e)**	**Recording frequency**	**Proportion of data to be monitored**	**How will the data be archived? (electronic/paper)**	**Comment**
9. *Vbag*	Tank capacity	Data of measuring of flow meter	м^3	m	Once	100%	Electronic / paper	A tank is filled with water. Amount of water that is taken into account by a flow meter will be the tank capacity. Measuring showed that the tank capacity is 0.11 м^3.
10. $w_{sampleCH4,i}$	Methane concentration in a sample	Data of measuring of gas analyzer EX - TEC® HS 660, EX - TEC® HS 680 or Variotec 8-EX	%	m	Each time while measuring	100%	Electronic	Concentration of methane in the sample (in a capacity) of emission is the difference between the concentration of methane in a sample at the beginning and in the end of measuring. The concentration is measured by means of gas analyzers EX - TEC® HS 660, EX - TEC® 680 or Variotec 8-EX.
11. τ_i	Period during which methane concentration in a tank reaches a certain level	Data of measuring of second measuring devices "SOS pr-2б-2"	Seconds	m	Each time while measuring	100%	Electronic	Time during which the concentration of methane in a capacity arrives at a stable level is determined by means of stop-watch. Measuring begins from the moment of opening of faucet on a lid of the tank and is finished at the achievement of concentration of methane in the capacity of stable level.

D.1.1.4. Description of formulae used to estimate baseline emissions (for each gas, source etc.; emissions in units of CO_2 equivalent):

Using the method of measuring of volume of emissions by means of impermeable capacity, the volume of baseline methane emissions from one equipment is calculated by the formula:

$\bar{F}_{CH_{4,i}}$ = Vbag * $w_{sampleCH4,\ i}$ * 3600 / τ_i where (4)

$\bar{F}_{CH_{4,i}}$ measured speed of baseline methane emissions through leaking equipment and before repair (m³/hour);

Vbag volume of impermeable tank for measure (m³);

$w_{sampleCH4,\ i}$ concentration of methane in the sample of emission *i* that is the difference of concentrations at the beginning and at the end of measuring (%);

τ_i average duration of filling to the tank for emissions i before its repair (seconds).

The speed of methane emissions got as the result of measuring is corrected to the normal[14] conditions ($P_н$ = 0, 1013 MPa, $T_н$ = 0 °C) as per the formula:

$$F_{CH_{4,i,B}} = \frac{\bar{F}_{CH_{4,i}} \cdot 273 \cdot P}{0{,}1013 \cdot (273+t)}, \text{ where} \quad (5)$$

$F_{CH_{4,i,B}}$ - flow rate of baseline (before repair, replacment) methane emission for i -element, corrected to the normal[14] conditions (m^3/hour);

$\bar{F}_{CH_{4,i}}$ - measured speed of baseline (before repair, replacment) methane emission for *i*- equipment, (m³/hour);

P – gas pressure in the tank, MPa;

t – temperature of gas in the tank, °C.

The annual baseline methane emissions are calculated as per the formula:

Q_{yB} = ConvFactor *Σ [$F_{CH_{4,i,B}}$ * Ti, y * URi]*GWPCH4*0.9, where (6)

[14] Standard DSTU 4313:2004 "Natural flammable gas. Measuring of consumptions. Terms and definition of notions"

Q_{yB} - baseline methane emissions on gas equipment for the period y (before repair, replacement) (tCO_2 equivalents);
ConvFactor - coefficient of counting of m³of CH_4 in tCH_4 at the normal[15] terms (0 degrees celsius and 101.3 kPa). It equals 0,0007168 tCH_4/m^3 CH_4;
$F_{CH_4,i,B}$ – flow rate of baseline (before repair, replacment) methane emission for *i*- equipment, adjusted to the normal[15] conditions (m^3/hour.);
URi - coefficient that takes into account the uncertainty range for the flow rate measurement method applied to physical leak *i* (95%);
Ti, y - time (in hours) for the equipment of i that functioned during the considered period y (monitoring period) before its repair (replacements);
GWP_{CH4} - Global Warming Potential for methane (/equals 21 tCO_2e/tCH_4);
0.9 - coefficient that take into account the measurement error of devices.

D.1.2. Option 2. Direct monitoring of emission reductions from the project (values should be consistent with those in section E.):

D.1.2.1 Data to be collected in order to monitor emission reductions from the project, and how these data will be archived:								
ID number *(Please use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
-	-	-	-	-	-	-	-	-

Direct monitoring of emission reduction is not used.

D.1.2.2 Description of formulae used to calculate emission reductions from the project (for each gas, source etc.; emissions/emission reductions in units of CO2 equivalent):

Direct monitoring of emission reduction is not used.

[15] Standard DSTU 4313:2004 "Natural flammable gas. Measuring of consumptions. Terms and definition of notions"

D.1.3. Determination of leakage in the monitoring plan:

D.1.3.1. If applicable, please describe the data and information that will be collected in order to monitor leakage effects of the project:

ID number *(Please use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
-	-	-	-	-	-	-	-	-

It is told in Methodology AM0023 version 4 that no significant leakage is expected to occur in these types of projects. Therefore they can be neglected.

D.1.3.2. Description of formulae used to estimate leakage (for each gas, source etc.; emissions in units of CO_2 equivalent):

No leakage is expected.

D.1.4. Description of formulae used to estimate emission reductions for the project (for each gas, source etc.; emissions/emission reductions in units of CO_2 equivalent):

The amount of Emission Reduction Units (ERU) and Assigned Amount Units (AAU) in tCO_2e is calculated as per the formulae:

$$ERU = \sum[Q_{yB} - Q_{yP}] \quad , \qquad (7)$$

$$AAU = \sum[Q_{yB} - Q_{yP}] \quad , \text{ where} \qquad (8)$$

ERU – Emission Reduction Units, t CO_2e;
AAU - Assigned Amount Units, t CO_2e;
Q_{yP} – Project emissions, t CO_2e;
Q_{yB} – Baseline emissions, t CO_2e.

D.1.5. Where applicable, in accordance with procedures as required by the host Party, information on the collection and archiving of information on the environmental impacts of the project:

Implementation of this Project does not provide for any negative environmental impact (See section F below). Therefore data collection on environmental impacts of the Project is not required. There are no laws or regulations in Ukraine requiring collection of such information.

D.2. Quality control (QC) and quality assurance (QA) procedures undertaken for data monitored:		
Data (Determine the table and identity number)	**Data uncertainty level (High/Middle/Low)**	**Please explain whether any QM/QA procedures have been scheduled for these data, or why there is no need to perform such procedure**
1.	Low	Every emission must be marked with a number and after repair there must monitoring conducted with the aim of determination of additional emissions
2.	Low	The magazine of data must be set there where for the equipment that often becomes disconnected, with the aim of measuring of the use hours
3.	Low	Working orders, instructions and other records must be kept in the additional magazine of repair
4.	Low	The participants of the Project will keep the records of any new values for greenhouse gases of accepted COP
5.	Low	The level of emissions will be measured and twice tested before repair - basic disparities will be warned by the third test. Otherwise speaking, if a gas analyzer is used for measuring of level of emissions, and if the results of two tests will considerably differ one from other, verification must proceed until then, when results of two measuring will be near to each other (to decrease any disparities in the process of testing). If a gas analyzer or any other equipment require re-calibration, to confirm exactness, the participants of project must accept necessary measures for this purpose.
6.	Low	The records of data about equipment that is calibrated and checked up take place on regular basis.
7.	Low	The records of data about equipment that is calibrated and checked up take place on regular basis.
8.	Average/Low	IPCC GPG will be consulted in the relation of the expected disparities.

9.	Low	Volume of impermeable tank does not change in course of time, therefore permanent verification of its volume is not obligatory.
10.	Low	Gas analyzers EX - TEC® HS 660, EX - TEC® HS 680 or Variotec 8-EX correspond to the requirements of the European standard EN50054/57 and pass annual calibration/check.
11.	Low	A stop-watch is a simple device and is not included in the list of devices that must pass an annual check. There will be used a stop-watch type "СОС пр-2б-2" or other type, which corresponds to GOST 5072-72.

D.3. Please describe the operational and management structure that the project operator will apply in implementing the monitoring plan:

Co-ordination of work of all departments and services of PJSC «Creamgas» is carried out in relation to introduction of JI project by the Working group created by Order of PJSC «Creamgas» deputy chairman of 09/04/2004 No 216. The update structure of the Working group was approved by the deputy chairman Orders №2 of 11/01/2005, №25 of 06/01/2007 and by Chief of the board Order №706 of 06/12/2011. The structure of the Working group is presented on Fig. 5.

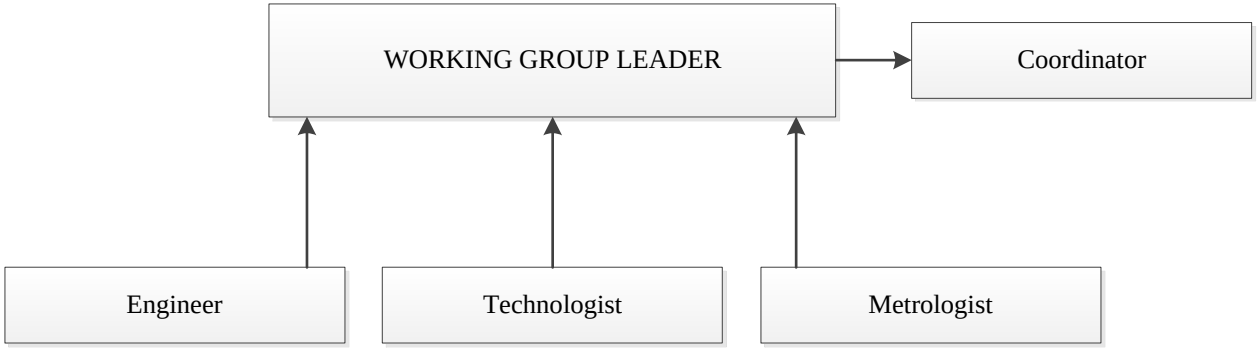

Fig.5. Structure of the Working group

Technologist is responsible for collection of all information provided for by monitoring plan, and for making all necessary calculations. Engineer is responsible for storage and archiving of all got information as a result of the conducted measuring and calculations. The Working-Group Leader determines plan of measurements under the Project and volume of necessary resources on the basis of received information. Metrologist provides presence of calibrated measuring equipment and makes technical support. Responsible for storage archiving, and backup – Working-Group Leader

D.4. Name of person(s)/entity(ies) establishing the monitoring plan:

PJSC “Creamgas”
95001 Ukraine, AR Crimea, Simferopol, Uchilischna Street, 42a.
phone: +380(652) 25-55-45
fax: +380(652) 25-55-45
E-mail: uprav1@gas.crimea.com
WWW: http://www.gas.crimea.com/
Contact person: Dribnyi Viktor Ivanovich

PJSC “Creamgas” is the Project participant.

SECTION E. Estimation of greenhouse gas emission reductions

E.1. Estimated project emissions:

The estimation of project emissions was performed on the basis of the data received according to the plan of monitoring presented in the point D.1.1.2 and Annex 3. The results of measurements and calculations done by LLC «Energy Technology Company «Energoalians» (see Accompanying document 2[16]) according to the certain monitoring plan, resulted in Table 5.

Table 5. Estimated Project *Emissions*

Year	Estimated project emissions (tons CO_2 equivalent)
2004	17 243
2005	51 112
2006	79 439
2007	92 986
Total 2004 - 2007	**240 780**
Annual average estimated emission reductions	60 195
2008	104 687
2009	119 466
2010	129 935
2011	137 324
2012	144 714
Total 2008 - 2012	**636 126**
Annual average estimated emission reductions	127 225
2013	147 793
2014	147 793
2015	147 793
2016	147 793
2017	147 793
Total 2013 - 2017	**738 965**
Annual average estimated emission reductions	147 793
Total (tons CO_2 equivalent)	**1 615 871**

[16] Accompanying document 2 – "Estimation of methane leakage reduction at gas equipment of GDP (CGDP), gas fittings, flange, threaded connections at PJSC "Creamgas" executed in an electronic form and submitted to the State Environmental Investment Agency of Ukraine and project inspectorate - company Bureau Veritas Certification Holding SAS.

E.2. Estimated leakage:

It is told in Methodology AM0023 version 4 that no significant leakage is expected to occur in these types of projects.
Therefore they can be neglected.

E.3. The sum of E.1. and E.2.:

As there is no leakage, the sum of E.1. and E.2. will be equal to E.1. (see Table 5)

E.4. Estimated baseline emissions:

Baseline emissions given in the Table 6 were evaluated similar to the project emissions, using the formulas given in item D.1.1.4.

Table 6. Estimated baseline emissions

Year	Estimated baseline emissions (tons CO_2 equivalent)
2004	116 162
2005	344 337
2006	535 175
2007	626 445
Total 2004 - 2007	**1 622 119**
Annual average estimated emission reductions	405 530
2008	705 269
2009	804 836
2010	875 363
2011	925 147
2012	974 931
Total 2008 - 2012	**4 285 546**
Annual average estimated emission reductions	857 109
2013	995 674
2014	995 674
2015	995 674
2016	995 674
2017	995 674
Total 2013 - 2017	**4 978 370**
Annual average estimated emission reductions	995 674
Total (tons CO_2 equivalent)	**10 886 035**

E.5. Difference between E.4. and E.3. representing the emission reductions of the project

Estimated annual reduction of greenhouse gas emissions in the project is calculated by the formula:

Estimated reduction of emissions in the project = Estimated baseline emissions – (Estimated project emissions + Estimated leakage) (9)

All results of evaluation of emission reduction in the project are given in the Table 7 below.

E.6. Table providing values obtained when applying formulae above:

Table 7. Expected emission reductions CO_2.

Year	Estimated baseline emissions (tons of CO_2 equivalent)	Estimated leakage (tones of CO2 equivalent)	Estimated project emissions (tons of CO_2 equivalent)	Estimated emission reductions (tons of CO_2 equivalent)
2004	116 162	0	17 243	98 919
2005	344 337	0	51 112	293 225
2006	535 175	0	79 439	455 736
2007	626 445	0	92 986	533 459
Total 2004 - 2007	**1 622 119**	**0**	**240 780**	**1 381 339**
2008	705 269	0	104 687	600 582
2009	804 836	0	119 466	685 370
2010	875 363	0	129 935	745 428
2011	925 147	0	137 324	787 823
2012	974 931	0	144 714	830 217
Total 2008 - 2012	**4 285 546**	**0**	**636 126**	**3 649 420**
2013	995 674	0	147 793	847 881
2014	995 674	0	147 793	847 881
2015	995 674	0	147 793	847 881
2016	995 674	0	147 793	847 881
2017	995 674	0	147 793	847 881
Total 2013 – 2017	**4 978 370**	**0**	**738 965**	**4 239 405**
Total (tons CO_2 equivalent)	**10 886 035**	**0**	**1 615 871**	**9 270 164**

SECTION F. Environmental impacts

F.1. Documentation on the analysis of the environmental impacts of the Project, including transboundary impacts, in accordance with procedures as determined by the host Party:

According to the ecological norms of Ukraine the natural gas emissions to the atmosphere are not pollutants (The Decree of the Cabinet of Ministers of Ukraine №1598 dated 29.2001 "About the statement of the list of the most widespread and dangerous polluting substances which emissions get to atmosphere is under regulation"). Therefore no ecological permissions on transporting and supply of natural gas are needed. The

only influence on environment by the Project implementation is reduction of natural gas emissions to the atmosphere.

The Environment Influence Estimation (EIE) is a part of design process and approvals receiption for project realization in the Ukraine. Rules of EIE implementation are based on the Ukrainean state regulatory document for construction DBNA.2.2.-1-2003[17].

Annex F to this standard contain the list of projects or activity whith higher ecological danger. Full-scale EIE is obligated for such projects, Department of Ecology and Natural Resources of Ukraine is competent authority. The project activity which concern to leaktightness of gas transportation system valving is abcent in this list.

Implementations of project activity have positive influence to the environment by means of natural gas fugitive leakages removing and PJSC «Creamgas» working conditions improvement.

Implementation of this Project will allow promoting safty operation of gas distributing pipelines that will decrease probability of explosions or fires.

Transboundary effects by the Project activity, in accordance with their definition in the text of the "Convention on transboundary contamination at long range", ratified by Ukraine will not occur.

The project activity does not cause harmful influence to the environment.

F.2. If environmental impacts are considered significant by the Project participants or the host Party, please provide conclusions and all references to supporting documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

The Project implementation does not foresee any harmful influence on the environment.

[17] Composition and content of materials for Environment's Influence Estimation during productions, buildings and facilities design and construction.

SECTION G. Stakeholders' comments

G.1. Information on stakeholders' comments on the Project, as appropriate:

Comments from local Stakeholders were not received, expected after PDD publication on the site. The Project activity does not foresee negative influence on the environment and negative social effect.

Annex 1
Contact information on project participants

Supplier:

Company:	PJSC «Creamgas»
Street, p.o. box:	Uchilischna Street
Building:	42a
City:	Simferopol
State/region:	AR Crimea
Postal-code:	95001
Country:	Ukraine
Phone:	+380 (652) 25-55-45
Fax:	+380 (652) 25-55-45
E-mal:	uprav1@gas.crimea.com
Website:	http://www.gas.crimea.com/
Represented by:	-
Position:	The Head of the Board
Reference:	-
Last Name:	Dribnyi
Patronymic:	Ivanovich
First Name:	Viktor
Department:	-
Direct fax:	-
Direct telephone:	-
Mobile:	-
Personal e-mail	uprav1@gas.crimea.com

Partner – the Buyer

Company:	Biotehnoloogia OÜ
Street, p.o. box:	Vene
Building:	19-3
City:	Tallinn
State/region:	-
Postal-code:	10123
Country:	Estonia
Phone:	+3726145136
Fax:	+3726145136
E-mal:	biotehnoloogia@gmail.com
Website:	http://www.biotehnoloogia.eu
Represented by:	-
Position:	Director
Reference:	Mister
Last Name:	Kaasik
Patronymic:	-
First Name:	Fred
Department:	-
Direct fax:	-
Direct telephone:	-
Mobile:	-
Personal e-mail	-

Annex 2

BASELINE INFORMATION

To determine the baseline the following parameters are used:

№	Parameter reference	Name to the parameter	Data measuring units
1.	i	The sequence number of gas equipment GDP (CGDP), gas armature, where methane emissions are found , removed, and then checked	Dimensionless
2.	Ti	The amount of hours of exploitation of equipment on which emissions were found during a year	Hour
3.	-	Date of repair (reconstruction)	Month and year
4.	GWP_{CH4}	Potential of the global warming for methane	tCO_2e / tCH_4
5.	$F_{CH4,i}$	Emission rate for each detected emission	m^3 CH_4/hour
6	t	Temperature	^0C
7	P	Gas pressure	MPa
8.	URi	Uncertainty range for the flow rate measurement method applied to physical leak *i*	%
9.	*Vbag*	Tank capacity	m^3
10.	$w_{sampleCH4,i}$	Methane concentration in a tank	%
11.	τ_i	Time when methane concentration reaches a stable level	second

The detailed specification of parameters for determination of the baseline is presented in tables of section B.1.

Calculation of the baseline is performed as per formulas (4), (5) and (6) (section of D.1.1.4).

Annex 3

MONITORING PLAN

The monitoring plan includes such divisions:

1. The program of the initial monitoring measuring of methane emissions on the gas equipment of GDP (CGDP), on gas armature, on the threaded and flanged connections of gas-distributing networks of PJSC «Creamgas».
2. Program of methane emissions's monitoring measuring on the gas equipment.
3. Map of methane emissions monitoring on the gas equipment GDP (CGDP), on gas armature, threaded and flanged connections of gas-distributing networks of PJSC «Creamgas».
4. Methodology of methane emissions' measuring.
5. Guidance on collection and storage of these monitoring measuring.

I. PROGRAM

Of initial monitoring measuring of methane emissions on the gas equipment GDP (CGDP), gas armature, threaded and flanged connections of gas-distributing networks of PJSC «Creamgas».

The aim of the initial monitoring measuring of methane emissions is:

1. Receipt of a more reliable estimation of methane emissions volumes from the gas-transport system (exept for the emissions, related to exploitation, technical service or emergency situations).
2. ERUs estimate during JI Project realization.
3. Definition of the potential income of the project and volume of repair work which are necessary under condition of an attractive time of recovery of outlay of the enclosed investments.
4. Determination of priorities in relation to works that must be executed on gas equipment.
5. Piling up of initial experience at the use of measuring equipment, determination of questions, that must be solved or improved (such as additional measuring equipment, degree of exactness of devices, necessity of studies of corresponding workers) before the beginning of the project, to provide him the proper work.

The program of the initial monitoring measuring has the following stages:

- determination of objects' list which will included to the JI Project boundary and object's Register making;
- determination of list of objects on which methane emissions are observed (quantity of initial measured objects should be more then 1% from total quantity objects^ listed in the Register);
- measuring of volumes of methane emissions on objects and emissions' documenting;
- methane emissions and ERUs estimate during JI Project realization;
- definition of the potential income of the project;
- determination of priorities in relation to works that must be executed on gas equipment.

1.1. Methodology of the emission reduction on the base of methan leakages' initial measuring on the GDP (CGDP) gas equipment, on gas armature, threaded and flanged connections of gas-distributing networks of PJSC «Creamgas»

Estimation of of baseline methane emissions

Initial monitoring measurements were carried out in accordance with the Methodology of measuring methane leakage (see Part IV).

During the initial measurements the following parameters were measured:

1. Temperature of air (t, ^{0}C)
2. Atmosphere pressure (P, MPa)
3. The initial concentration of methane in the tank for measurements (w_0, %)
4. The concentration of methane in the tank for measurements, which was attained in180 seconds after the start of measurement (w, %)
5. Interval (τ, s.) during which the concentration of methane in the tank reached the value w (180 seconds).

Calculation of methane leakage rate at each equipment unit is calculated using the formula (4) of the PDD:

$F_{CH4,\,i} = V_{bag} * w_{sampleCH4,i} * 3600 / \tau_i$, where (1)

$F_{CH4,\,i}$ - speed of methane leakage due to leaking methane equipment (m³ / hr.);
V_{bag} - volume of hermetic tank for measurements (0,11 m³);
$w_{sampleCH4,i} = (w - w_0)$ - methane concentration in leakage sample *i*, that is the difference of concentrations at the beginning and the end of measurement (%);
τ_i - time interval, during wich methane concentration in the tank reached value w (τ_i =180 s.).

The resulting measurements of methane leakage rate is worked out to normal conditions (P_n = 0,1013 MPa, T_n = 0 °C) according to the formula (5) of the PDD:

$$F^0_{CH4,\,i} = \frac{F_{CH4,\,i} * 273 * P}{0{,}1013 * (273 + t)}, \quad \text{where} \qquad (2)$$

$F^0_{CH4,\,i}$ – rate (volume) of baseline methane leakage for element i, worked out to normal conditions (m^3/hr.);
P – gas pressure in the tank, MPa;
t – gas temperature in the tank, °C.

After calculating the rate of each measurable leakage under normal conditions the average rate values of **baseline leakage** for one GDP / CGDP and for one unit of gas fittings of gas distribution networks are determined according to the formulae:

$$F^B_{CH4,\,ave.GDP} = \frac{\Sigma F^0_{CH4,\,GDP}}{N_0}; \qquad (3)$$

$$F^B_{CH4,\,ave.arm} = \frac{\Sigma F^0_{CH4,\,arm}}{n_0}, \quad \text{where} \qquad (4)$$

N_0 - number of GDP/ CGDP, whereat the measurements were made,
n_0 - number of units of gas fittings, whereat the measurements were made.

Baseline methane emission per year (Q_B , m^3/year) is calculated according to the formula:

$Q_B = Q_{B,\,GDP} + Q_{B,\,arm}$, where (5)

$Q_{B, GDP}$ - annual baseline methane emission at all gas equipment of GDP/CGDP;
$Q_{B, arm}$ - annual baseline methane emission at all gas fittings of gas distribution networks.

In turn, annual baseline methane emission at gas equipment of GDP/CGDP and gas fittings of gas distribution networks were calculated according to the formulae:

$$Q_{B, GDP} = F^{B}_{CH4, ave.GDP} * N * URi * 0,9 * R * 24 *365 / 12 * M, \quad (6)$$

$$Q_{B, arm} = F^{B}_{CH4, ave.arm} * n * URi * 0,9 * R * 24 *365 / 12 * M \text{ , where} \quad (7)$$

N - number of GDP/CGDP, included in the project boundary (accordind to the JI Project Register),
n - number of fittings units, included in the project boundary (accordind to the JI Project Register),
URi - coefficient which takes into account the uncertainty of the method of measurements (URi = 0,95);
R - percentage of repaired (replaced) gas equipment in the current year;
M - number of months of the year in which repaired (replaced) gas equipment functioned;
0,9 - coefficient which takes into account the error of metering equipment;
24 - number of hours in a day;
365 - number of days in a year;
12 - number of months in a year.

Estimation of project emissions

To estimate project emissions the assumption, that as a result of the project activity 80% of baseline emissions at gas equipment of GDP / CGDP and 90% of baseline emissions at the gas fittings will be eliminated, have been made. Thus, the average values of hourly **project methane leakage** were calculated according to the formulae:

$$F^{P}_{CH4, ave.GDP} = F^{B}_{CH4, ave.GDP} * (100\%-80\%); \quad (8)$$
$$F^{P}_{CH4, ave.arm} = F^{B}_{CH4, ave.arm} * (100\%-90\%). \quad (9)$$

Project methane leakage per year (Q_P , m^3/year) was calculated according to the formula:

$$Q_P = Q_{P, GDP} + Q_{P, arm} \text{ , where} \quad (10)$$

$Q_{P, GDP}$ - annual project methane emission at all gas equipment of GDP/CGDP, which included to the Project boundary,
$Q_{P, arm}$ - annual project methane emission at all gas distribution networks' fittings, which included to the Project boundary.

In turn, annual project methane emission at gas equipment of GDP/CGDP and gas fittings of gas distribution networks were calculated according to the formulae:

$$Q_{P, GDP} = F^{P}_{CH4, ave.GDP} * N * URi * 0,9 * R * 24 *365 / 12 * M, \quad (11)$$
$$Q_{B, arm} = F^{P}_{CH4, ave.arm} * n * URi * 0,9 * R * 24 *365 / 12 * M, \text{ where} \quad (12)$$

N - number of GDP/CGDP, included in the project boundary (accordind to the JI Project Register),
n - number of fittings units, included in the project boundary (accordind to the JI Project Register),
URi - coefficient which takes into account the uncertainty of the method of measurements (URi = 0,95);
R - percentage of repaired (replaced) gas equipment in the current year;
M - number of months of the year in which repaired (replaced) gas equipment functioned;
0,9 - coefficient which takes into account the error of metering equipment;

24 - number of hours in a day;
365 - number of days in a year;
12 - number of months in a year.

Estimation of emission reductions

Methane emission reductions are calculated according to the formulae:

$Q_{CH4} = Q_B - Q_P$ (m^3/year), (13)

And greenhouse gases emission reductions per year are calculated according to the formula:

$Q_{CO2} = Q_{CH4} * ConvFactor * GWP_{CH4}$ (tCO_2/year) , where (14)

ConvFactor - Conversion Factor of m³CH4 into tCH4 under normal[1] conditions (0 ^{0}C and 0,1013 MPa).

ConvFactor = 0,0007168 tCH4/m³CH4;

GWP_{CH4} - Global Warming Potential for methane (is equal to 21 tCO2eq/tCH4).

II. PROGRAM

Of methane emissions monitoring measuring on the gas equipment GDP (CGDP), gas armature, threaded and flanged connections of gas-distributing networks of PJSC «Creamgas»

The aim of the methane emissions monitoring measuring is:

1. Receipt of a reliable rate of methane emissions volumes from the gas-transport system during JI Project realization (exept for the emissions, related to exploitation, technical service or emergency situations).
2. ERUs estimate during JI Project realization.
3. Prevention of the repeated methane emissions from the repaired (replaced) equipment of gas-transport system during JI Project realization.
4. Preparation of data for monitoring reports.

During of methan monitoring measuring activity

- executed the methane emissions measuring on every gas equipment units of GDP (CGDP) and gas armature of gas-distributing networks of PJSC «Creamgas», included to the JI Project boundary and to the Project Registry,
- eliminated the methane emissions leakages (repairing, replacement) on every gas equipment units of GDP (CGDP) and gas armature of gas-distributing networks of PJSC «Creamgas», included to the JI Project boundary and to the Project Registry,
- executed the after-repairing (after-replacement) methane emissions measuring on every gas equipment units of GDP (CGDP) and gas armature of gas-distributing networks of PJSC «Creamgas», included to the JI Project boundary and to the Project Registry,
- executed the repeated methane emissions measuring on every gas equipment units of GDP (CGDP) and gas armature of gas-distributing networks of PJSC «Creamgas», included to the JI Project boundary and to the Project Registry,
- compared the measured methane emissions on gas equipment with emissions volume measured after first repairing (replacement) of equipment,
- assigned the gas equipment with repeated methane emissions leakages for urgent repairing (replacing).

[1] Standard DSTU 4313:2004 "Natural flammable gas. Measuring of consumptions. Terms and definition of notions"

Quality information (for example, difficulties in measuring on concrete valves through the limited access to them et cetera) also must be fixed, wherein it is possible to facilitate planning and implementation of the Project.

The system of the name/ numeration of gas equipment must be concerted before THE BEGINNING of measuring.

Tables, stated below must carry explanatory and actual information, not order and normative character.

Table 1MP. Information about an object - (name of GDP or CGDP)

Recorded technical verification of gas equipment of GDP (a magazine is on service that is conducted by inspectors) - one time per four days, is performed by the corresponding authorized worker. Emissions are specified in the magazine of reports. Gas contamination is determined under the use of gas detector with the aim of providing of PBSGU requirements with the aim of prevention of emergency situations.

Current repair is conducted one time per year, technical service - one time per half-year.

Name of GDP (CGDP) (code according to the Register)	Gas pressure at entrance /exit, (MPa)	Average volume of the transported gas, m^3/hour.	% CH_4 (methane) in gas
1	2	3	4

Table 2MP. Protocol of measuring of methane emissions (name of GDP or CGDP)

Dates of realization of measuring: _____
Atmospheric pressure during realization of measuring: _____ (MPa)
Temperature of air during realization of measuring: _____ (^{0}C)
Volume of impermeable tank: _____ (m^3)

No.	Name of gas equipment	Measurement of the air flow sample		Time of filling the leakage-proof tank, sec
		Background concentration , %	Concentration of sample by the end of measuring, %	
1	2	3	4	5
1	Catch at the entrance to the object			
2	Inlet cock			
3	Three –way cock with manometer			
4	Filter			
5	Bolt bypass			
6	Three –way cock with manometer			
7	Bolt bypass			
8	manometer			
9	PZK			

No.	Name of gas equipment	Measurement of the air flow sample		Time of filling the leakage-proof tank, sec
		Background concentration , %	Concentration of sample by the end of measuring, %	
1	2	3	4	5
10	Pressure regulator			
11	Outlet cock			
12	Comb with faucets			
13	PSK			
14	Manometer			
15	Cock at the exit from the object			
Second reducing line				
16	Inlet cock			
17	Three –way cock with manometer			
18	Filter			
19	manometer			
20	PZK			
21	Pressure regulator			
22	Outlet cock			
23	Comb with faucets			
24	PSK			
25	manometer			

Measurement were conducted by: _____
_____
_____

Explanation to Table 2.

(1) Sequence number of equipment as per the register.
(2) Names of equipment.
(3) Base-line concentration is a concentration of methane in impermeable tank before the beginning of measuring (by volume percent).
(4) Concentrations of sample is a concentration of methane in impermeable tank at the end of measuring (by volume percent).
(5) Time filling of impermeable tank by methane to the set concentration (seconds).

Table 3MP. Protocol of measuring of methane emissions on gas armature

Date of realization of measuring: _____
Atmospheric pressure during realization of measuring: _____ (MPa)
Temperature of air during realization of measuring: _____ (^{0}C)
Volume of impermeable tank: _____ (m^3)

№	Code as per Register	Address	Measuring of air flow sample		Time of leakage-proof tank filling, sec
			Methane background concentration, %	Sample concentration %	
1	2	3	4	5	6

Measurement were conducted by: _____
_____
_____

Explanation to Table 3MP.

(1) Sequence number of gas armature.
(2) Codes of gas armature as per Register.
(3) Addresses of location of gas armature.
(4) Base-line concentration is a concentration of methane in impermeable tank before the beginning of measuring (by volume percent).
(5) Concentration of sample is a concentration of methane in impermeable tank by the end of measuring (by volume percent).
(6) Time of impermeable tank filling with methane to the value of concentration (6) (seconds).

III. MONITORING CARD

of methane emissions on the gas equipment GDP (CGDP), on gas armature, threaded and flanged connections of gas-distributing networks of PJSC «Creamgas»

The monitoring card determines the general order of realization of the annual measuring of methane emissions on gas equipment GDP (CGDP), gas armature, flanged and threaded connections of gas-distributing networks of PJSC «Creamgas» , that are included in the limits of the JI project.

In accordance with Project activity, every found methane emissions on gas equipment of GDP (CGDP), gas armature, flanged and threaded connections of gas-distributing networks of PJSC «Creamgas» must be marked with an individual number.

With the aim of marking of found methane emission an individual number of PJSC "Creamgas" draws the Register of gas-distributing points and gas armature of JI Project "Reduction of methane emissions on gas equipment GDP (CGDP), gas armature, flanged and threaded connections of gas-distributing networks of PJSC «Creamgas» (further as per the text of the Register), also the individual number (code) is appropriated for every object, and also such data are specified:

- place of location of equipment (address);
- type of equipment
- type of connection of equipment with the gas-transport system (for shunt-down devices);
- amount of flanged connections;
- amount of the threaded connections;
- conditional diameter;

- pressure of gas, on that an equipment is counted;
- year of introduction to exploitation;
- setting point (for the gas armature of gas-distributing networks).

In a period from 2004 to 2008 measuring of methane emissions on gas equipment is conducted annually only on that equipment, which was repaired during the current year, works of pressurizing or replacement of equipment, conducted in accordance with Chart of Project Implementation (it. 4 Division A.4.2 of PDD).

Measuring of volumes of methane emissions on gas equipment during realization of the first repair (replacements) of equipment in accordance with Chart of Project Implementation is conducted twice: the first time -before repair (replace) equipment, the second time - after repair (replacements).

Beginning from 2009 measuring of volumes of methane emissions are conducted not rarer, than one time per year on every gas equipment of PJSC «Creamgas» , that is in the Register, to ascertain, that the gas equipment did not become the source methane emission again.

Technical maintenance of gas equipment that is in the Register is conducted not rarer than one time per half of a year.

Permanent repair of gas equipment that is in the Register is conducted one time per year.

In the case when the monitoring measuring of methane emission from the gas equipment shows presence of the volume emission that exceeds the volume of emission after the first repair (replacement) of equipment, such equipment must be repaired (substituted) in the near-term order.

IV. METHODOLOGY OF REALIZATION OF METHANE EMISSIONS MEASURING

Composition of brigade for realization of measuring:
Master of service exploitation of street gas pipelines and court introductions (SESG and CI);
A locksmith on exploitation and repair of gas equipment of GDP - 1 man;
A locksmith SESG and CI - 1 man.

Necessary materials, instruments and devices:

1) Keys, instruments;
2) Highly sensitive gas analyzer;
3) Impermeable (leakage-proof) tank, impermeable sack, hose, encapsulant, sticky ribbon (scotch);
4) Manometers;
5) Thermometer;
6) Barometer;
7) Stop-watch;
8) Compressor;
9) Fire-extinguisher.

There is a chart of fluidizer realization of measuring of methane emissions (see Fig. 1).

.

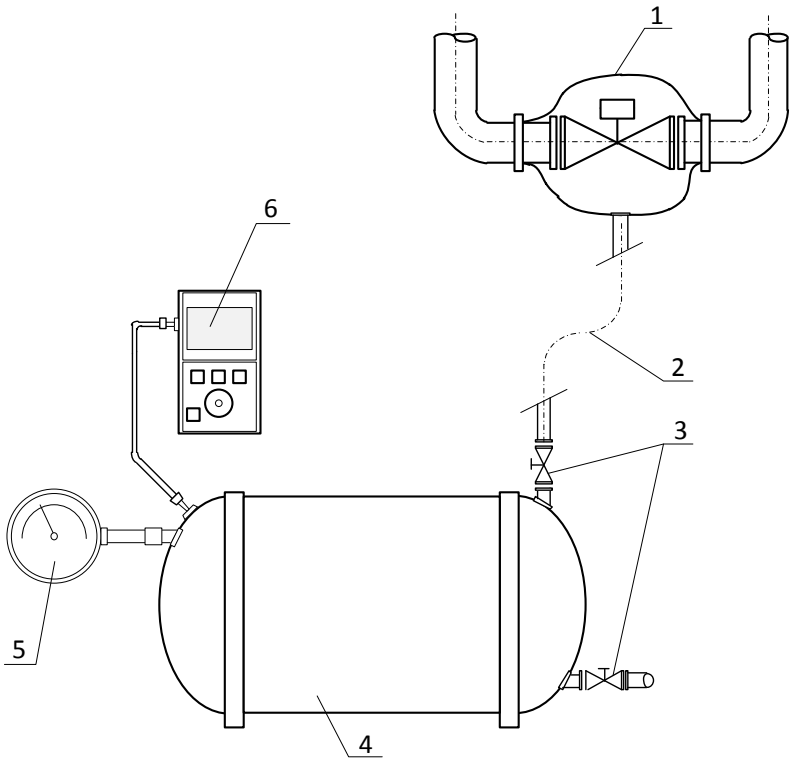

Fig.1. Diagram of Methane Leakage Device.

References:
1. Insulated bag
2. Hose
3. Cock
4. Insulated reservoir
5. Pressure gauge
6. Gas analyzer.

Support of measuring quality

Devices using for measuring should be verified and calibrated by authorized standardizing authority.

Calibration period

The devices that requires calibration procedures and is used in the monitoring of methane leakages are

- gas analyzer EX-TEC® HS 660, Variotec® 8-EX. Inter-calibration interval is 1 year.;
- manometer "Д-59Н-100-1.0 6 kPa", inter-checking interval is 1 year;
- thermometer type TL-4, inter-checking interval is 2 years.
- second meter " SOS pr-2b-2", Inter-calibration interval is 2 years;
- barometer aneroid BAMM-1, Inter-calibration interval is 2 years.

As a result of verification (calibration) the certificate confirming the technical serviceability of device is issued.

Order of realization of methane emissions measuring on the gas equipment of GDP (CGDP) and gas armature of gas pipelines:

1. To check GDP (CGDP, well) where gas equipment and gas armature are placed, on that measuring will be conducted, if it is not gassed. To conduct intention of gas contamination of GDP (CGDP, well) the gas analyzer.
2. To set a tank (4). To put a sack (1) on an element, on which measuring of methane emission will be conducted.
3. To connect a sack (1) and tank (4) with the help of the hose (2).
4. By a sticky ribbon to overbalance connection of the hose (2) and sack (1) for impermeability of connection.
5. To measure with the gas analyzer (6) the base-line concentration of methane in tank (4) and to enter its value in the minutes of measuring.
6. To open a faucet (3) in the place of connection to the hose (2) with a tank (4) and to include a stop-watch.
7. To close a faucet (3) in the place of connection to the hose with a tank in 180 seconds, to turn off a stop-watch.
8. By means of gas analyzer (6) to define the concentration of methane in tank and enter its value in the minutes of measuring.
9. Control of pressure of gas in tank (4) is done with the help of the manometer (5).
10. To define the temperature of air by means of thermometer type TL4 and enter its value in the minutes of measuring.
11. To define atmospheric pressure by a barometer and enter its value in the minutes of measuring.
12. After measuring to disconnect a hose (2) from the tank (4).
13. To open a faucet (3) for ventilation of the tank (4).

Data fixed during realization of measuring of source of methane in protocol of measuring:

1. Name and code of GDP (CGDP) (if measuring is performed on gas equipment of GDP (CGDP).
2. Name, code of gas equipment GDP (CGDP) or gas armature of gas pipeline on that measuring of methane emission is conducted.
3. Address of location of GDP (CGDP) (if measuring is spent on gas equipment of GDP (CGDP)) or gas armature on which measuring of methane emission is conducted.
4. Date of realization of measuring
5. Temperature of air (^{o}C).
6. Atmospheric pressure (MPa).
7. A base-line concentration of methane in tank (%)
8. Concentration of methane in tank at the moment of completion of measuring (%)
9. Duration of measuring (up to the methane concentration reaches a stable level, min 180 sec).
10. The last names, name and patronymic of persons that conducted measuring.

V. GUIDANCE
on collection and storage of monitoring measuring data

Realization of JI Project provides for:

1. Starting and next regular monitoring inspections of every gas equipment that is in the register and realizations of measuring of methane emissions.
2. Repair (replacement) of threadbare gas equipment.

All data must be collected and entered in one database. The database must be constantly filled up during all term of action of JI Project, including data about the new sources discovered and removed during the project duration.
It is recommended to create a Working force on JI Project at the enterprise, and to define responsibility for collection of all information on the JI Project, storage and archiving of documents on the Project of JI to the separate members of the Working group.
Basic information generators for the calculation of units of reduction of methane emissions are documents, the properties of which are given in Table 5 below:

Table 5MP. List of preliminary documents formed during JI Project realization

№	The name of document	Document data source	Document format	Person who draws the document	Document is formed for the purpose	Place of document storage
1	Register of gas equipment of GDP (CGDP), gas armature, threaded and flange joints	Technical documentation	Electronics table	Technical personnel and accounting office of the enterprise	To mark the places of methane emissions	At the coordinator of JI Project Working group
2	Protocols of measuring of sources of methane	Beginning and monitoring measuring	Filled paper forms with measuring data signed by the executing personnel	Masters of exploitation service	To form the information of the beginning and monitoring measurings	At the coordinator of JI Project Working group
3	List of the initial and monitoring measuring of methane emissions	Protocols of measuring of methane emissions	Electronic table	Authorized member of Working group	To calculate the volumes of methane emissions	At the coordinator of JI Project Working group
4	Calculation of volumes of methane emissions	PTD and Information of the monitoring of methane emissions measuring	Electronic table	Authorized member of Working group	To form Monitoring reports	At the coordinator of JI Project Working group

№	The name of document	Document data source	Document format	Person who draws the document	Document is formed for the purpose	Place of document storage
5	Report magazines on the exposure of sources	Reports of inspectors of exploitation service of gas pipelines and GDP (CGDP)	Filled paper forms with data on found emissions during duty once per four days	Masters of exploitation service of pipelines and GDP (CGDP)	For emissions elimination	At departments of exploitation service of pipelines and GDP (CGDP)
6	Magazines of technical maintenance of GDP (CGDP)	Supervision of inspectors of exploitation service	Filled paper forms	Workers of exploitation service of GDP (CGDP)	To supervise technical state of the equipment	In the middle of GDP (CGDP)