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

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Annexes

SECTION A. General description of the project

A.1 Title of the project:

Methane Emissions Avoidance in Tula gas distribution network.
PDD version 1.0
December 3, 2006

A.2. Description of the project:

The purpose of the project is to improve the integrity of Tula regional gas distribution network via reducing leakage of methane from the system. This will be accomplished by activities that detect, measure and repair leakages at gas regulator stations in the natural gas system operated by the company Tulaoblgaz. Leaks are potentially found in flanges, tube fittings, pipe thread connectors, block valves, regulators, plug valves and pressure relief valves. There are also leaks from fractured parts of pipelines which are not covered by this project. Current practices only result in temporary leak reductions from larger leaks, due to the inadequacy of repair materials and practises, as further described in B.2 and Annex 2. Current inspection and repair activities are motivated by safety concerns and not by loss of natural gas as a valuable resource or by its detrimental effect on the environment.

As part of the project, all sites are inspected for leaks from all standardised components (valves and flanges). Any leak detected will be measured, recorded and repaired, using Gore-Tex joint sealant and valve stem packing. Due to the climatic conditions in Tula, project activities can only be performed during a period from about mid April to mid November[1]. The leak detection and repair work began in May 2006, and is planned to be concluded in September-October 2007. If leaks re-emerge those leaks will be measured and repaired again. This will be done in conjunction with the monitoring plan of the JI project. In addition, Tulaoblgaz will get accustomed to the use of more advanced leak detection and repair practices for the benefit also of its regular leak inspection and maintenance activities on a permanent basis beyond the crediting period of this project.

In addition to the reduction in greenhouse gas (GHG) emissions, the project will have important ancillary benefits such as conservation of natural gas to the benefit of end users of gas, health effects due to the elimination of asbestos as a repair material, lower risks of accidents related to gas leaks and dissemination of modern technology related to leak detection and repair as well as improved measurement practises, all of which have great replication potential throughout Russia.

[1] This timing may vary and could be as late as mid-November. The timing is determined by the occurrence of 3 consecutive 24 hour periods of below zero weather.

A.3. Project participants:

Party involved*	Legal entity project participant (as applicable)	Please indicate if the Party wishes to be considered as project participant (Yes/No)
Russian Federation- Host Party	• OJSC Rosgazifikatsiya • Centergazservice-opt, LLC • OJSC Tulaoblgaz	No
To be determined	• Russian Carbon Fund	No

*please indicate if the Party involved is a host Party.

The project is developed by Russian Carbon Fund, a private company engaged in development of Joint Implementation (JI) projects. Tulaoblgaz, operates and owns the distribution gas system in the Tula Oblast except from parts of the gas distribution system within Tula city itself, which are owned and operated by Tulagorgaz and which are not included in this project. Tulaoblgaz is majority-owned by Rosgazifikatsiya, which is a state owned company with a mandate to operate about 30% of gas distribution systems in Russia. For the purpose of gas leak reduction projects a subsidiary of Rosgazifikasiya, Centergazservice-opt, has been established to coordinate the project activities. Tulaoblgaz will under supervision of Centergazservice-opt be responsible for implementation of leak reduction activities under the project and monitoring of project emissions. ECON Carbon a.s. has been retained as technical advisor and has developed the PDD.

Russian Carbon Fund is investor and has contractual title to emission reductions resulting from the project. Russian Carbon Fund is the only project participant in the meaning that no other party has a say in the distribution of the credits.

This PDD has been developed on the basis of the PDD ("Methane Emission Avoidance in Kursk Gas Distribution Network") for a similar JI project in the Kursk region. DNV finalized provisional determination of the project in May, 2006.

A.4. Technical description of the project:

A.4.1. Location of the project:

The project is conducted for the gas distribution network of Tulaoblgaz which is located throughout the Tula Oblast of the Russian Federation except from the city of Tula. Therefore the project encompasses the entire oblast apart from the gas distribution system in the city of Tula operated by Tulagorgaz.

A.4.1.1. Host Party(ies):

The Russian Federation.

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

Tulaoblgaz supplies end users of gas in the Tula Oblast in the Russian Federation. The Tula Oblast is situated in north central European Russia, bordering the Moscow region to the north-east.

The population of the Tula Oblast is 1 815 000, its area 25.7 thousand sq. km.

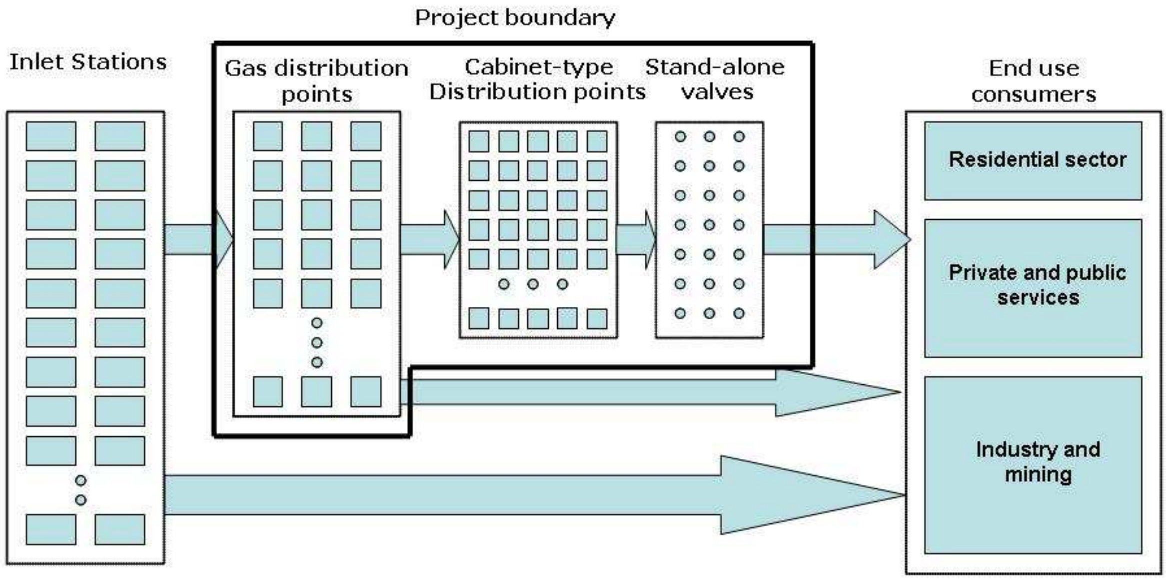
A.4.1.3.	City/Town/Community etc:

Tulaoblgaz is the sole provider of natural gas for the entire Tula Oblast , except for the city of Tula, and thus the project encompasses the whole Oblast but the parts of gas distribution system within Tula city, not operated by Tulagoblgaz.

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

Tulaoblgaz operates a medium and low pressure gas distribution system with an annual gas throughput in the range of 3.2-3.7 BCM in recent three years. The supply network covers about 9,000 km of pipes, including components at 1.2 MPa, 0.6 MPa, 0.3 MPa and low pressure pipes to final residential consumers. Stepping down of pressure takes place in so-called gas distributions points, of which there are 920 within the physical boundary of the project, as well as in cabinet type distribution points of which there are 1,590 within the project boundary. In addition to these 2,520 distribution points, which together contain approximately 11,005 valves, the project targets stand-alone valves. Number of stand-alone valves is approximately11,935. Total number of valves is thus 22,940. Total number of flanges is estimated to be 62,008. The project does not include underground valves and flanges as the adopted monitoring procedures for this JI project can not be implemented for underground installations.

Figure 1 Sketch of pipeline network, Tulaoblgaz

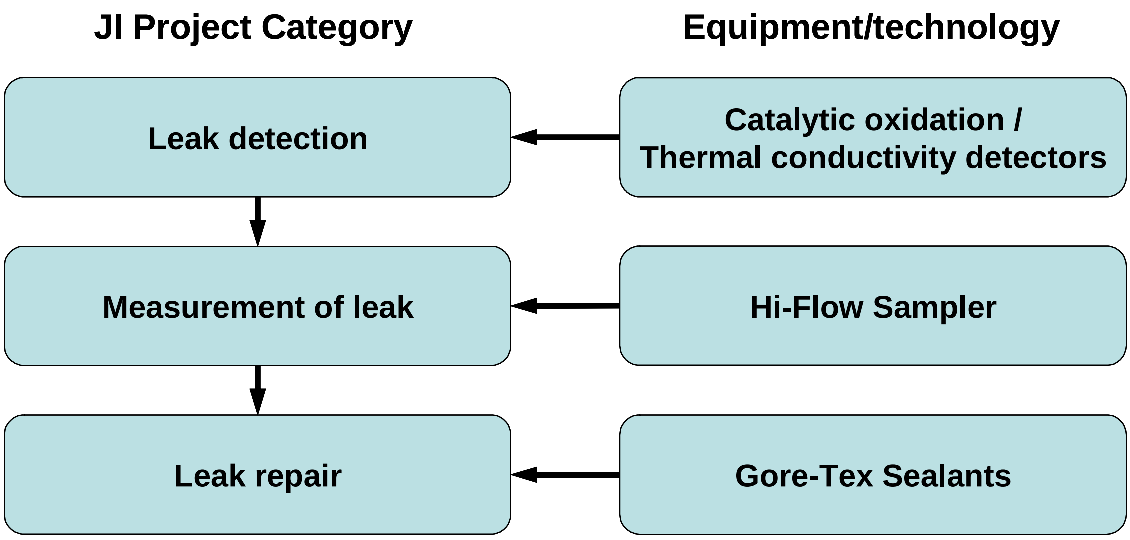


A.4.2. Technology(ies) to be employed, or measures, operations or actions to be implemented by the project:

The JI project activity includes detection, measurement and repair of methane leaks from remote, stand-alone valves and from flanges and valves at the gas distribution points and the cabinet type distribution points of the Tulaoblgaz gas distribution network. Leak repair is conducted by replacement with improved sealing material. The project is one of several similar projects in preparation or under development by Russian Carbon Fund in collaboration with Rosgazifikatsiya and Centergazservice-opt. State of the art technologies have been purchased for the purpose of conducting reliable detection of leaks, accurate measurements of leak rates and achieving durable leak repair. Further, a program has been initiated to train local staff of the gas distribution companies in use of the technology and related procedures established by the JI project activity.

The JI project activity and the application of the new technology and equipment can be separated into four categories as shown in Figure 2:

Figure 2 Project activities



Leaks are detected using catalytic oxidation/thermal conductivity detectors (Heath Gasurveyor 3-500, see www.heathus.com).

Each component (valves or flanges) with leaks will be tagged with a unique serial number. The next stage is to measure the leak rate by use of a Hi-Flow Sampler. The Hi-Flow Sampler makes leak rate measurements with the same accuracy as enclosure measurements but at a speed approaching that of a leak detection screening instrument. The Hi-Flow Sampler uses a high flow rate of air to completely capture the gas leaking from components. A catalytic oxidation/thermal conductivity sensor is then used to measure the sample concentration in the air stream of the high flow system. The Hi-Flow Sampler essentially performs an enclosure measurement using the flow regime induced by the sampler instead of a physical enclosure.

The Hi-Flow Sampler to be used for measurement of detected leaks was developed by the Gas Research Institute in the USA and then tested by the industry from 1997, most notably by Enron. The Hi-Flow samples differs from organic vapour analyzers (OVA) and other measurement tools in that it provides a direct volumetric measurement of methane flowing from a leak. It is also faster to use and much more accurate. A series of experiments have been conducted to validate the results of the Hi-Flow Sampler. Typical results from laboratory tests shows an average difference between metered leaks (with rota meter) and the Hi-Flow Sampler of 3-4% and with maximum differences to be slightly above 10%. This is considerably more accurate than with OVA and similar equipment, let alone the equipment currently being used in Tula and other parts of Russia.[2]

Leaks from valves will be repaired using Gore-Tex valve stem packing. This material is a pliable, self-lubricating packing that eliminate stem wear with durable effects. The continuous-length packing installs easily and forms a cohesive cylinder when compressed, eliminating the need to cut and form rings. In most cases it is not necessary to remove the valve from service, and no re-assembly is required. Once installed, a slight turn on the gland nut is all the maintenance that is usually required. The manufacturer of

[2] Further information on the development and use of the Hi-Flow Sampler is found on http://www.epa.gov/gasstar/

Gore-Tex valve stem packing declares the equipment to have been in service for years in severe operating conditions without faults, and the manufacturer guarantees that the stem packing will be replaced free should it fail, provided that it has been installed properly in a sound valve.

Flanges will be repaired using a Gore-Tex joint sealant, which is also inferior to currently used material, albeit much more expensive (up to 20 times) as is Gore-Tex valve stem packing.

All repaired leaks will be checked immediately after repair with the catalytic oxidation/thermal conductivity detector to confirm successful repair.

The team to monitor repaired components will use the catalytic oxidation/thermal conductivity detectors to spot any re-emerging leaks. Re-emerging leaks are then measured by the High-Flow Sampler and repaired again. Both the leak detector and the Hi-Flow-Sampler have a display showing whether there is a leak and the leak rate (in the case of the Hi-Flow Sampler). Digital photographs are taken of this display information together with a time stamp, and also showing the serial number of the monitored/repaired component. The information is written down at the spot and later compiled in a database (see Annex 3 Monitoring Plan).

A.4.3. Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) 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:

The project reduces anthropogenic GHG emissions by the near elimination of methane emissions from stand alone valves and from flanges and valves at gas distribution points and cabinet type distribution points in the gas distribution system operated by Tulaoblgaz.

With current practise repaired leaks typically re-emerge, due to the poor quality of sealing material. The predominant material used currently for valves is a packing consisting of a round twisted cord made of flax sodden with oil, graphite and asbestos. The material loses containment after pressure variations and changes in weather conditions. For flanges elastic oil and gasoline resistant rubber and paronite (compressed asbestos gaskets) are used.

The JI project activity offers a comprehensive programme for inspection and detection of leaks from valves and flanges. By use of catalytic oxidation/thermal conductivity detectors practically all leaks from these valves and flanges will be traced and measured by the Hi-Flow Sampler. The Gore-Tex joint sealant and valve stem packing provide durable elimination of the leaks. It is therefore expected that emission reductions will be equal or close to the level of (ex-ante) measured leaks, although monitoring will establish whether repairs have been effective.

The gas distribution company has no financial benefit from reducing methane leakages. The company does not purchase and sell the gas, but is merely paid by the volume of gas distributed, as measured at the inlet stations. There are no legal requirements that prohibit gas leaks, but emissions of methane are subject to a pollution tax. This pollution tax has two levels: 50 roubles are paid per ton below a threshold of 0.6% of the gas transported in the system, which is considered “normal”. Above the threshold, 250 roubles should be paid.

The pollution tax is paid by the gas distribution company to the state, as the distribution company is responsible for the leaks. However, the gas distribution company is reimbursed by the gas supplier company for the pollution tax for any gas lost below the threshold. For reductions of emissions above the 0.6% threshold, the gas distribution company could theoretically have direct financial benefits from reducing emissions provided that this tax was sufficiently high to induce improved detection and repair practices.

However, Tulaoblgaz does not pay this higher tax, as emissions are always considered by regulation authorities to be below the threshold. One reason is that emissions are not measured, because neither the regulating authorities nor gas distribution companies have sufficient measurement equipment to determine the emissions volume (in absence of the JI project). In actual fact, gas distribution companies might have a direct disincentive to start measuring leaks, because they could prove to be higher than stipulated emissions.

Therefore the current procedures in Tulaoblgaz, which are common practice by gas distribution companies in the Russian Federation, are on detection and repair of gas leaks that represent a safety risk. The quality of current detection and repair practises is, however, inferior to what will be acquired and used for this JI project. The “additionality” arguments are further developed in section B.2 below.

Picture 1 Repair of valves

Picture 2 Old sealant

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

Emission reductions are established by subtracting emissions after project implementation from emissions in the baseline scenario. No emissions outside the project boundaries need to be accounted for (see section E.2). Baseline emissions are only known when leaks are detected and measured prior to repair. Project emissions are known when repaired leaks are monitored. In most cases repaired flanges and valves are expected to show no leaks, but if they do re-emerge, leaks will be measured and accounted for in the monitoring reports.

Because leak rates are only measured during project implementation, estimates of emission reductions in this PDD are based on leak rate measurements from a sample of valves and flanges conducted at gas distribution points, cabinet type of gas distribution points and stand alone valves in Tulaoblgaz gas distribution system.

Table 1 provides information on the sample which has been applied for estimating baseline emissions in this JI project.

Measured average leak rates for the sample of valves and flanges shown in Table 1 are 3.7 litres per minute (LPM) for valves and 0.3 LPM for flanges. Applying these rates for the entire population of valves and flanges of Tulaoblgaz gives an annual level for the leaks of 54.8 million m^3 of gas. Converting this to CO_2 equivalents using the factor 0.0007168 to convert one m^3 of CH_4 to one tonne of CH_4 and taking into account that the global warming potential of one tonne of CH_4 is 21 tonnes of CO_2 equivalents, the annual baseline emissions are 824,223 tonnes of CO_2 equivalents as shown in Table 1.

Table 1 Estimates on baseline emissions.

Component	**Number of Components**				**Leak Estimates**		
	Total	In sample	With Leaks in sample		LPM(*) in sample	Methane Emissions m^3/year	Methane Emissions tCO_2e/year
Valves	22,940	653	113	17.3%	3.7	44,767,062	673,870
Flanges	62,006	1,700	21	1.2%	0.3	9,988,367	150,353
Total	84,948	2,353	134	5.7%	1.3	54,755,429	824,223

*LPM: Litres per minute; average leak rate for all components in sample

From the estimates of baseline emissions, 824,223 tonnes CO_2 equivalents per annum, possible project emissions, due to re-emerging leaks, need to be taken in to account in order to arrive at estimates of emissions reductions. Currently no data exist on the frequency and scale of repair failures. It is here assumed that such occurrences imply that emissions reductions are 96% of baseline emissions, or 791,254 tonnes CO_2 equivalents per annum. The emissions reductions are shown in Table 2. The reductions for 2006 and 2007 are less than the annual average for the period 2008 to 2012, since repairs are conducted and become effective during the period from 2nd quarter 2006 to 3rd quarter 2007.

Table 2 Estimated emissions reductions

Length of the crediting period	Years 10
Year	**Estimate of annual emission reductions in tonnes of CO_2 equivalent**
2008	791,000
2009	791,000
2010	791,000
2011	791,000
2012	791,000
2013	791,000
2014	791,000
2015	791,000
2016	791,000
2017	791,000
Total estimated emission reductions over the crediting period (tonnes of CO_2 equivalent)	**7,910,000**
Annual average of emission reductions over the crediting period (tonnes of CO_2 equivalent)	**791,000**

A.5. Project approval by the Parties involved:

Approvals by the Russian and other annex B country Focal Points are pending.

SECTION B. Baseline

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

It has been chosen here to apply a baseline and monitoring methodology developed in conjunction with a CDM project development activity in Moldova and approved by the CDM Executive Board in July 2005 as AM0023 ("Leak reduction from natural gas pipeline from compressor or gate stations" available at http://cdm.unfccc.int).

AM0023 lists three conditions for applicability, these are:

1. Where natural gas pipeline operators have no current system in place to systematically identify and repair leaks;
2. Where leaks can be identified and accurately measured;
3. Where a monitoring system can be put in place to ensure leaks repaired remain efficient.

This project meets all these conditions.

Concerning the *first condition*, the gas pipeline operator, Tulaoblgaz, conduct inspections for leak detection more often than required by regulation. Its leak detection and repair activities are primarily motivated by safety concerns and based on expectations to where the weak points may be found according to experience, however, without the possibility of measuring the size of leak rate. Lack of modern leak detection and measurement equipment implies that a systematic and effective leak repair programme cannot be performed.

Concerning the *second condition*, the purchase of leak detection and leak measurement equipment (Section A.4.2.) and surveys of leak rates (Table 1, Section A.4.3.1.) have demonstrated that by application of modern technology and practices leaks can be identified and accurately measured.

Concerning the *third condition*, the introduction of procedures, a comprehensive database and supporting equipment will ensure reliable monitoring of repaired leaks, and detection of any re-emerging leaks. (See Monitoring Plan Annex 3). Further, training of local staff and procedures of quality assurance will ensure than the monitoring is performed according to the plan.

AM0023 also states that the methodology is applicable to project activities that reduce leaks in natural gas *long-distance transmission systems*. The methodology was developed to support a PDD for gas leak reduction from a long distance (high pressure) pipeline system in Moldova. The project presented in the present PDD is a *low pressure gas distribution system*. However AM0023 does not contain any features that make it less applicable to low pressure pipeline systems. Further, technical and commercial functions of the pipeline operator Tulaoblgaz are relevant and applicable to the functions described in AM0023. The application of the methodology to this project follows directly from the outline of the AM0023 methodology.

Baseline scenario

Only two scenarios are considered plausible and credible alternatives as a baseline:

1. continuation of the current leak detection and maintenance practices; and
2. the proposed project not implemented as a JI project.

AM0023 is only applicable if alternative (1) is the most likely baseline scenario. The arguments are made in this PDD that the continuation of the current leak detection and maintenance practices is the most likely course of action in absence of the project, hence being the baseline scenario.

Emission reductions

Determination of emission reductions of the project follows the approach presented in AM0023 by estimating reductions ex-ante and subsequently with determination of emission reductions ex-post.

The level of emission reductions is as per AM0023 determined in the following steps:

1. The current practise of leak detection and repair is described. Clear and transparent criteria are established to identify whether the detection and repair of a leak would also have occurred in the absence of the project
2. The time schedule for replacement of equipment in the absence of the project are determined
3. Data on leaks is collected during project implementation
4. The functioning of the repair is checked during implementation
5. Emission reductions are calculated ex-post based on data collection in the previous steps

The adaptation of these steps to this JI project is described in the following.

Step 1 Current practise of leak detection and repair.

AM0023 states that “Only those types of leaks that are not detected and repaired under current practises are considered in the calculation of emission reductions”. Our interpretation of this statement is that it does not exclude components that have been subject to repair or might be subject to repair in the baseline scenario. We find it appropriate to include emission reductions also from components where baseline repairs were conducted because maintenance and repair activities of the baseline scenario are very different from those of the project in the use of material and hence in their effectiveness/durability. The baseline repairs use material with only temporary leak prevention whereas the Gore Tex material used in the JI project provides durable leak elimination. For a more detailed explanation see section B.4 and Annex 2.

Step 2 The time schedule for replacement

This step is considered not to be required for this project. Currently valves and flanges leaks are addressed by repairs of sealing material as described in this PDD (see Annex A), whereas valves themselves are replaced only in event of identification of valve brake/crack. Expected operational lifetime of valves is 40 years and there exist no preventive replacement programme as valves are replaced as required – and for safety reasons - if it is believed that detected leaks are occurring from valves brake/cracks. However, due to poor flexibility and the fast deterioration of sealing material used when installing new valves to replace broken valves, this offers only temporary leak prevention.

Step 3 Leak data collected during project implementation

Step 3 will be organised in conjunction with the repair activities of all flanges and valves covered by the project. Leak detection will be carried out by use of catalytic oxidation/thermal conductivity detectors. Valves and flanges will be repaired once the leak rate has been measured. A Hi-Flow Sampler will be used for leak rate measurements. The Hi-Flow Sampler will measure leaks at two different flow rates, saving each measurement in the Hi-Flow Sampler. If the measurements differ by more than 10%, there might be some human error, and a new set of measurements will be made after the team has repositioned itself. The lower of the two numbers will be written down, and used as the baseline emissions rate (see Monitoring Plan, Annex 3). After the repair, a new leak detection measurement will be carried out to ensure that the leak was properly repaired, and if required additional repairs will be made until no further leaks can be detected. If leaks can not be eliminated, remaining leaks will be measured and recorded.

Data to be collected will be included in the monitoring reports. All data is stored in a database. Each monitoring report will include complete information from this database. See Annex 3 for more details.

Step 4 Checking the functioning of the repair during implementation

Step 4 is the monitoring of emissions during the project to check for re-emerging leaks. The monitoring plan for this project covers all valves and flanges that have been subject to repair. This is done by use of the same leak detection equipment as during the first inspection before (the first) repair. For components where no re-emerging leaks can be found, emissions from that component are taken to be zero for the entire period since the last inspection/monitoring. For components were a leak is found to have re-emerged, the leak rate is measured by use of the same measurement equipment as in the initial survey (Hi-Flow Samplers). This leak rate is assumed to have remained at the same level since the day after the last project repair of the valve, or after monitoring of the repaired leak which ever is most recent. This is consistent with the principles set in AM0023. Such leaks will be repaired again followed by new leak measurements.

Data to be collected will be included in the periodic monitoring reports. All data is stored in a database. Each monitoring report will include complete information from this database. See Annex 3 for more details.

Step 5 Calculation of emissions reductions

Emissions reductions from the project are determined as the difference between emissions measured prior to the repair (Step 3) and after the repair (Step 4). In the (hypothetical) case of after-repair emissions being larger than measured before-repair emissions, the component in question will have a negative emissions reduction. In other words, the methodology allows for project emissions to exceed emissions in the baseline scenario.

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

As prescribed in AM0023 the "Tool for the demonstration and assessment of additionality" agreed by the Executive Board (CDM Additionality Tool)[3] are used to demonstrate additionality of the project.

Step 0 – Preliminary screening based on the starting date of the project

Not relevant for JI.

Step 1 – Identification of alternatives to the project consistent with current laws and regulation

Sub-step 1a Define alternatives to the project activity

Only two scenarios are considered plausible and credible alternatives as a baseline:

Alternative 1: Continuation of the current leak detection and maintenance practices.

Alternative 2: The proposed project not implemented as a JI project

Alternative 1: Continuation of current leak detection and maintenance practise is the least cost option for Tulaoblgaz. The current repair of leaks using graphite and other material is the least-cost method of repairing leaks but is technically inferior to using Goretex. However given Tulaoblgaz' financial situation the continued use of graphite is the preferred option.

Alternative 2: In accordance with AM0023, as part of the identification of candidate baseline scenarios it should be determined " *if similar efforts have been made or are expected to be made to reduce methane*

[3] For full description visit http://cdm.unfccc.int/EB/Meetings/016/eb16repan1.pdf

leaks from key components such as unit valves, blow down valves, rod packings and pressure relief valves, using similar capable leak detection and measurement technologies as described in this methodology". The answer to this question is "no". Tulaoblgaz does not have incentives or the means to undertake the efforts of this project in the absence of JI support (see sub-step 1b, step 2 and step 3 below).

The proposed project provides additional costs for leak detection and measurement equipment, for repair material and for training of staff. The gas distribution company has no incentives to conduct the here proposed JI project activity or "similar efforts" absent the JI-benefits.

Assessment: It is not realistic that the gas distribution company will incur additional cost by applying alternative 2. It can therefore be concluded that the only credible alternative to this JI project activity is alternative 1.

Sub-step 1b. Enforcement of applicable laws and regulations

Alternative 1: Continuation of current leak detection and maintenance practices are in compliance with all applicable laws and regulation. Gas leaks are not prohibited by law. Regulations prescribe only the frequency by which gas distribution companies should carry out inspections of installations to detect for leaks. The current leak detection practice carried out by Tulaoblgaz is compliant with this regulation. Enforcement is made up by annual spot checks by the regional technical inspection company acting on behalf of the state.

Alternative 2: The present routine leak detection programme of Tulaoblgaz will continue to exist in parallel with the introduction of more advanced leak detection and measurements and durable leak prevention measures, as offered by this project. Accordingly, alternative 2 would also be compliant with the existing regulatory requirements to leak inspection of distribution points as well as any other relevant requirements.

Result: Pass

Step 2 – Investment Analysis

Sub-step 2a: Determine appropriate analysis method

As the project generates no financial or economic benefits other than the JI related income, the simple cost analysis is used[4] - in accordance with the additionality tool - to determine that the proposed project activity is the economically less attractive alternative without the JI benefits.

Sub-step 2b- Option 1. Apply simple cost analysis

The project activity involves additional costs to the continuation of current leak detection and maintenance activities. The additional costs incur due to the advanced leak detection and measurement equipment and due to the repair material which is approximately ten times more expensive than the domestically manufactured material currently being used. Moreover, additional costs incur due to training

[4] In accordance with the CDM Executive Board's "Tool for the demonstration and assessment of additionality (version 2), 28 November 2005."

of staff. In particular, substantial training is required in using the advanced leak detection and measurement equipment.

Tulaoblgaz do not have any direct economic benefits from the leak reductions achieved through the project. Tulaoblgaz is a provider of transport services for the gas supplied from JSC Gasprom to final consumers. JSC Gasprom is the supplier of gas from the high pressure gas pipeline and has meters to determine the amount of gas entering the Tulaoblgaz distribution system.

According to Government regulation № 162 issued 5th February 1998, JSC Gasprom can charge end use consumers (i.e. not Tulaoblgaz but the final users) for the gas metered at the exit of the high pressure gas pipeline minus a 0.6% stipulated loss, as “allowable gas volume losses”. Since Tulaoblgaz is only paid for the transport volume of gas, metered when it enters its gas system, there is no benefit to Tulaoblgaz for reducing distribution losses exceeding 0.6%. It is only the end users of gas who will benefit from reduced losses to the extent that they currently pay for a higher volume of gas than what is actually delivered.

State Regulation № 344 issued 12th June 2003 set a pollution tax on 225 pollution substances, of which one is methane. The tax rate for methane pollution it is equal to 50 rub (appr. $ 1.75) per 1 tCH_4 for emission within fixed limits (established case-by-case by tax authorities) and 250 rub. per 1 tCH_4 (appr. $ 8.75) if pollution is over fixed limits. It is far below the price for natural gas even in the domestic market (approximately $ 43.5 taking into account that a ton of CH_4 is equal to 1.45 thnd. m^3).

The pollution tax for leaks up to the threshold of 0.6% is paid by Tulaoblgaz. The tax is then reimbursed Tulaoblgaz by the gas supplier company, who eventually passes this cost onto gas consumers as a specified amount for the pollution tax in addition to gas consumption. Reductions of emissions that take place below the threshold do not affect the financial balance of the gas distribution company in any way – increases or decreases in the pollution tax are wholly matched by increases or decreases in the reimbursement from the gas supplier company. In principle Tulaoblgaz should cover the pollution tax for gas leaks above the 0.6% threshold. However this tax is currently not collected because:

- Neither the regulating authority nor companies have sufficient measurement practices to determine pollution volume.
- No pollution emission limits are established. It requires solid data based on pollution measurement of all pollutants in all spheres and all regions of the Russian Federation. As no pollution measurements are being conducted at present it will take a long time to compile this database.
- There is no methodology to calculate the volume of pollution emission.

In summary, Tulaoblgaz is currently not faced with any financial penalty from the pollution tax and hence no financial gain is made in terms of less taxation from reduced leaks. Enforcement of State Regulation № 344 and issuance of any new regulation that might affect additionality will be monitored (see Annex 3 Monitoring Plan).

As leak reduction do not in any case generate any economic benefits to the gas distribution company and as this JI project activity does not generate any economic benefits to the project owners (project developer) other than the JI benefits, it is concluded that the JI project activity absent the JI-benefits is not financial attractive and thus faces investment barriers absence the JI benefits.

In accordance with the additionality tool of the CDM Executive Board and with the AM0023, the next step in determination of the additionality of this JI project is Step 4.

Result: Pass

Step 4 - Common Practice

Sub-step 4a Analyze other activities similar to the proposed project activity

The lack of financial incentives described under step 2 is not only relevant to Tulaoblgaz but prevalent throughout the low pressure gas distribution system in Russia. For this reason the approach taken in leak detection and repair presented as the baseline scenario of this project is common practice in Russia.

By and large the same leak detection devices as in Tula are used throughout Russia and the use of repair material to reduce leaks differs little from region to region. Equipment to measure leak rates is not available to any gas distribution company in Russia, and repair material used are normally either graphite or asbestos.

The project involves the use of advanced leak detection and measurement practises and equipment. Such equipment and practises are relatively new and not yet used on a broad scale internationally, see http://www.epa.gov/gasstar/. Similar projects to this project are under preparation or development by the Russian Carbon Fund. These projects by the Russian Carbon Fund introduce the catalytic oxidation/thermal conductivity detectors and a Hi-Flow Sampler to identify and measure gas leaks in Russia**.** The project requires not only the purchase of the relevant equipment but also training of Tulaoblgaz staff to operate it.

It is the prospect of JI financing that has enabled the project developer to make preparation of this JI project as well as of similar projects. This includes the purchase of one Hi-Flow Sampler, missions by an international expert to undertake sample leak detection, measurements and repairs and the initial training of local staff. Thus, it is believed that any similar activities to this JI project are being developed and implemented in the Russian Federation in expectation of being offered benefits under JI.

Result: Pass

Step 5 – Impact of JI Registration

The expected income from the sale of AAUs and ERUs is for the project developer the only source of revenues from the project. Without these revenues the projects developer would not have the means to undertake the activities of the project.

Result: Pass

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

The physical boundary of this project is the gas distribution points, the cabinet type distributions points as well as remote, stand-alone valves operated by Tulaoblgaz, some 2,510 sites in total. The project includes only emissions of methane from valves and flanges at these sites and does not encompass pipeline leaks or emissions from regular operation of the engines or other equipment (e.g. combustion or flaring). Therefore the boundary of the project is the same as that set in AM0023.

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

The baseline scenario represents a continuation of the current program for leak detection and maintenance of Tulaoblgaz. Various leak detection devices are used, but primarily in relation to inspection of pipelines in accordance with Industry Standard OCT 153-39.3-051-2003, which prescribes the frequency at which pipelines should be inspected.

According to industry standards (No. 153-39.3-051-2003) inspection should be carried out once a month at distribution points (i.e. at gas distribution points and cabinet type distribution points) within cities and once every six months outside cities. For safety reasons – and based on expectations to where the weak points are to be found, inspections are currently carried out more often than required by law. If leaks are detected, repair by means of sealing material is carried out immediately unless repair requires the gas to be shut off.

The main material that is used at the valves is a gas pipeline packing consisting of a round twisted cord made of flax soaked with oil, graphite and asbestos. This material loses containment after pressure variations and under the influence of changing weather. Initially the cord is elastic due to the oil, and the cord fills all holes between rod and valve walls. After some period of time (approximately 1-2 months), the cord dries out. It is still vapour-proof until the rod is adjusted when regulating pressure. After this, the packing needs to be replaced because it will leak. Further details of baseline practices and estimates of baseline emissions are presented in Annex 2. This Annex has been prepared in October 2006 by Torleif Haugland of ECON Carbon.

The actual leak reduction cannot be measured for two reasons:

- Detection of leaks are not done continuously but only with certain time intervals as described in the Monitoring Plan (Annex 3)
- Baseline leaks (after the project has been implemented) are by their nature hypothetical and cannot be measured.

It is therefore important that the approach taken in calculation of baseline and project emissions and the ensuing emission reductions is conservative (meaning that the calculated emissions reductions are likely to be lower than the actual). The following approach for calculating emission reductions is applied:

Total baseline emissions (TBE): Emissions measured before leak repairs[5] (measured in volume per minute) multiplied with the number of minutes of the crediting period. This means that the measured baseline leak rate is assumed to stay constant over the crediting period.

Total project emissions (TPE): Emissions measured after repair (measured in volume per minute). It is expected that few, if any, leaks will be detected after repair (leak rate=0). However for the case that leaks re-emerge the measured leak rates will be considered to have remained at the measured level since the day after the most recent previous inspection or repair.

The argument for this being a conservative way of estimating emissions reductions (TRE=TBE-TPE) is based on two key features with leaks and leak repairs in Tula:

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[5] Note that all valves will be repaired

- Leak rates typically vary over the season, with higher leak rates in late autumn, winter and early spring. In November the pressure in the pipeline is increased for the heating season. The high pressure for the winter will affect all existing leaks by increasing the leak rate. In the spring time frost heaving occurs and causes the pipeline to bend and twist often causing new leaks in flanges and valves. Given these effects the average leak rate in the summer season, when the JI project repair is done, will be lower than in the heating season.

- Leak rates will typically increase over time due to wear and tear of the components. This will especially be the case for leaks in the country side due to low inspection activities. Therefore the baseline leaks rates which are assumed to be constant over time will underestimate the actual average leak rates of the crediting period of the project.

In addition, and possibly the main contributor to conservative calculation of emissions reductions is the fact that the project activity includes repair of all valves, also those not having any leaks at the time of initial inspection. Some of these values would probably have had leaks a later stage in the baseline scenario. These leak reductions are not included in emissions reductions from the project.

SECTION C. Duration of the project / crediting period

C.1. Starting date of the project:

The project started with the first leak detections and repairs in May 2006.

C.2. Expected operational lifetime of the project:

25 years

C.3 Length of the crediting period:

Crediting period is set at 10 years equating 120 months starting from January 1, 2008.

Pending decisions on the framework for generation and transfer of emissions reduction credits post 2012, the project developer may seek the right to earn credits for the period 2013 to 2017 in addition to emission reductions units (ERUs) generated under the first commitment period of the Kyoto Protocol (2008 to 2012).

“Early credits” in the form of assigned amount units (AAUs) or emission reduction units (ERUs) will be sought for 2006 and 2007 pending regulatory framework for JI in the Russian Federation.

SECTION D. Monitoring plan

D.1. Description of monitoring plan chosen:

The monitoring methodology applied to the project is based on the monitoring methodology approved by the CDM Executive board, AM0023/Version 01. The name of the methodology is: “Leak reduction from natural gas pipeline compressor or gate stations”. However, the variables and equations are adjusted to the specific features of the current project.

The approved monitoring methodology prescribes the use of certain type of technologies. The catalytic oxidation/thermal conductivity detectors used for leak detection and the Hi-Flow Sampler used for leak measurement in this project falls within the categories mentioned in AM0023. The other conditions for applicability are mentioned and discussed in section B.1 above.

All data necessary to estimate anthropogenic GHG emissions by sources within the boundary of this project as well as procedures to collect and archive these data are addressed by the monitoring plan.

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

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.3)*	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
D-1 *Z*	*Number*	*Number of Component inspected and repaired and then re-surveyed.*	*Number*	*M*	*Once*	*100%*	*Electronic*	*Each component will be tagged with a number and monitored after repair for re-emerging leaks.* *To support documentation digital photography will be used.*

D-2 Mz$_{periodt}$	*Time*	*Minutes of equipment operation for each component*	*# of minutes per reporting period*	*M*	*Const ant*	*100%*	*Electronic*	*Based on records of the time of initial repair and subsequent monitoring, minutes the component has been in operation during the reporting period is counted*
D-3	*Time*	*Repair and monitoring log*	*Date of repair and monitoring*	*M*	*Const ant*	*100%*	*Electronic*	*Time of repair or monitoring (date, hour, minutes) will be recorded for each component that is repaired as part of the JI project. In cases of re-emerging leaks, the re-emerging leak will be assumed to have occurred the minute after the most recent check which showed no leak.*
D-4 LMPz$_{periodt}$	*Ratio*	*Leak rate of* CH_4 *for each leak detected*		*M*	*Const ant*	*100%*	*Electronic*	*For each leak point the leak rate is measured twice and the lower rate is used for calculation of emissions. Every leak rate measured is automatically adjusted by the Hi-flow sampler to standard conditions i.e. they reflect a pressure at 1.013 bar and temperature at 1 degrees Celsius*
D-5 GWP$_{CH4}$	*Global Warming Potential*	*IPPC*	*Tonnes of CO2 equivalent*	*C*	*Const ant*	*100%*	*Electronic*	*Project developer will monitor any changes in the methane global warming potential value published by the IPCC*

D.1.1.2. Description of formulae used to estimate project emissions (for each gas, source etc.; emissions in units of CO_2 equivalent):

Project emissions are those detected and measured as re-emerging leaks (i.e. faulty leak repairs). The leaks will be identified and measured in a manner similar to the baseline calculation. However, unlike the calculations of baseline emissions which are only done once prior to the initial repairs, project emissions are calculated regularly as part of the Monitoring Plan.

Total project emissions ($TPE_{CO2periodt}$) for a period t (one specific period covered by a monitoring report) is the accumulated leaks over the period for components where re-emerging leaks have been detected and measured. Leaks for each component are calculated as the leak rate (litres per minute) multiplied by the length of the period (minutes). It follows from this that the leak rate for each component is assumed to stay constant over the course of the period.

The sequence of these calculations and the formulas applied are as follows:

(1) $PEz_{periodt} = Mz_{periodt} * LMPz_{periodt}$

$PEz_{periodt}$ is leak from component z during period t. Each component covered by the JI project activity has a unique serial number z.

$Mz_{periodt}$ is the number of minutes component z has been in operation from start to end of period t.

$LMPz_{periodt}$ is measured leaks of CH_4 at the end of period t from component z, measured in litres per minute.

(Components where the repair has been effective (no faulty repair) will have $LMPz_{periodt} = 0$)

(2) $TPE_{periodt} = \Sigma PEz_{periodt}$ =(Sum over all components/serial numbers with leaks)

(3) $TPE_{CO2periodt} = TPE_{periodt} * GWP_{CH4}$

$TPE_{periodt}$ is CH_4 emissions from re-emerging leaks for period t.

GWP_{CH4} is the Global Warming Potential of methane (in tonnes CO_{2eq}/m^3 methane).
The GWP is calculated by converting the volume of methane calculated from the Hi-Flow Sampler measurements to tonnes of methane using the molecular weight and molecular volume of methane: tonnes of methane per cubic meter of methane (tCH_4/m^3CH_4). At standard temperature and pressure (1 degree Celsius and 1,013 bar) the density of methane is 0.0007168 tCH_4/m^3CH_4. This value is then multiplied by the IPCC-1996 conversion of 21 tonnes CO_{2eq}/tonnes CH_4. Again at standard pressure and temperature this is 0.015028 tonnes CO_{2eq}/m^3 methane.

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*	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

D.2.)								
D-1 *Z*	*Number*	*Number of Component inspected and repaired and then re-surveyed.*	*Number*	*M*	*Once*	*100%*	*Electronic*	*Each component will be tagged with a number and monitored after repair for re-emerging leaks. To support documentation digital photography will be used.*
D-2 Mz_{yearx}	*Time*	*Minutes of equipment operation for each component*	*# of minutes per reporting period*	*M*	*Constant*	*100%*	*Electronic*	*Based on records of the time of initial repair minutes the component has been in operation during the year is counted*
D-3	*Time*	*Repair and monitoring log*	*Date of repair and monitoring*	*M*	*Constant*	*100%*	*Electronic*	*Time of repair or monitoring (date, hour, minutes) will be recorded for each component that is repaired as part of the JI project.*
D-4 $LMPz_{yearx}$	*Ratio*	*Leak rate of* CH_4 *for each leak detected*		*M*	*Constant*	*100%*	*Electronic*	*For each leak point the leak rate is*

								measured twice and the lower rate is used for calculation of emissions. For each leak point the leak rate is measured twice and the lower rate is used for calculation of emissions. Every leak rate measured is automatically adjusted by the Hi-flow sampler to standard conditions i.e. they reflect a pressure at 1.013 bar and temperature at 1 degrees Celsius
D-5 GWP_{CH4}	*Global Warming Potential*	*IPPC*	*Tonnes of CO2 equivalent*	*C*	*Constant*	*100%*	*Electronic*	*Project developer will monitor any changes in the methane global warming potential value published by the IPCC*

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

Baseline emissions are calculated using the leak rates measured by the Hi-Flow Sampler prior to the initial repair. For the purpose of these calculations it is assumed that pre-repair leak rates, measured for each component, in absence of the JI project activity would have stayed constant over the crediting period of the project.

The sequence of the calculations and the formulas applied for baseline emissions are as follows:

(1) $Lz_{periodt} = Mz_{periodt} {}^{*} BLMPz$

$Lz_{periodt}$ is calculated baseline leak from component z for period t. z is the unique serial number of a component repaired under the JI project activity.

$Mz_{periodt}$ is the number of minutes component z has been in operation during period t.

BLMPz is the measured (baseline) leak rate (litres of CH_4 per minute) prior to repair

(2) $TL_{periodt} = \Sigma \, Lz_{periodt}$ **=(**Sum over all components/serial numbers of the JI project activity)

$TL_{periodt}$ is total CH4 emissions calculated for all components covered by the JI project activity (components subject to repair) as baseline emissions for period t

(3) $BE_{CO2\ periodt} = TL_{periodt} * GWP$

$BE_{CO2periodt}$ is the baseline emission in CO_{2eq} calculated for period t from all components that have been repaired as part of the JI project activity

The GWP is calculated by converting the volume of methane calculated from the Hi-Flow Sampler measurements to tonnes of methane using the molecular weight and molecular volume of methane: tonnes of methane per cubic meter of methane (tCH_4/m^3CH_4). At standard temperature and pressure (1 degree Celsius and 1,013 bar) the density of methane is 0.0007168 tCH_4/m^3CH_4. This value is then multiplied by the IPCC-1996 conversion of 21 tonnes CO_{2eq}/tonnes CH_4. Again at standard pressure and temperature this is 0.015028 tonnes CO_{2eq}/m^3 methane.

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

Option 2 is not relevant as emission reductions from the project will be derived from monitoring of baseline emissions and from monitoring of project emission. Data collected for monitoring of baseline emissions are those found in table D.1.1.3. Data collected for monitoring of project emissions are those found in table D.1.1.1. Accordingly, the table D.1.2.1 below is left blank on purpose.

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

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 CO_2 equivalent):

See the description in section D.1.4.

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

No leakage is expected, as per AM0023. Accordingly, table D.1.3.1 below is left blank on purpose.

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

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, as per AM0023

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 total emission reduction (**$ER_{CO2\ periodt}$**) for the project is calculated by subtracting the total project emissions (**$TPE_{CO2periodt}$**) from the baseline emissions (**$BE_{CO2\ periodt}$**). Thus, if total project emissions are zero (as would be the case if all repairs are 100% effective), the project emission reduction is equal to the baseline emissions. The formulae used to estimate total project emissions and baseline emissions are described in sections D.1.1.2. and D.1.1.4., respectively.

$$ER_{CO2\ periodt} = BE_{CO2\ periodt} - TPE_{CO2periodt}$$

Where **$ER_{CO2\ periodt}$** is total project emission reductions and **$BE_{CO2\ periodt}$** and **$TPE_{CO2periodt}$** are baseline emissions and project emissions as described above.

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:

Not applicable.

D.2. Quality control (QC) and quality assurance (QA) procedures undertaken for data monitored:		
Data *(Indicate table and ID number)*	Uncertainty level of data (high/medium/low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
D-1	*Low*	*Each valve for which a leak is detected will be tagged with a unique serial. After repair, the valve will be monitored for any additional leaks.*
D-2 and D-3	*Low*	*The data logger capability of the Hi-flow sampler will be used. For double checking purpose and documentation, digital photography will be taken of the display reading next to the leaking component with numerical tag. Digital photography will be archived in the Repair and Monitoring Log at the office of Tulaoblgaz for the period until two years after the crediting period.*
D-4	*Low*	*Leak rates will be measured and double checked before repair – major discrepancies (10%) will warrant a new set of tests. Should the hi-flow sampler or other equipment need recalibration or adjustment to ensure their accuracy, the project participants will take the necessary action to do so.*
D-5	*Low*	*Project participants will keep track of any new GWPs adopted by the COP*
D-6	*Medium/Low*	*Data recording equipment will be calibrated and double checked on a regular basis.*

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

Monitoring plan will be implemented by Tulaoblgaz staff. Tulaoblgaz will provide detection and measurement of methane leaks by its certified technicians, repair works and documentation of leaks during the whole crediting period. Centergazservice-opt and Russian Carbon Fund will provide methodological supervision and support to Tulaoblgaz, as well as measurement equipment and Gore-Tex sealing materials. Monitoring report will be prepared by Centergazservice-opt. Quality control and quality assurance will be performed by both Centergazservice-opt and Russian Carbon Fund.

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

Centergazservice-opt establish the monitoring plan in consultation with Russian Carbon Fund.

SECTION E. Estimation of GHG emission reductions

E.1. Estimated project emissions:

As described above, project emissions will only be monitored and calculated ex-post. Should leaks re-emerge from repaired components these will be detected and measured according to the procedures of the Monitoring Plan. The repair with Gore Tex material represents an effective and durable elimination of leaks from components where leaks are detected. Therefore project emissions are estimated to be very small. For the sake of presenting an ex-ante estimate here, we have reduced estimates by 4% to take into account possible faulty repairs and errors inaccuracies in the leak rates from the surveyed leaks.

E.2. Estimated leakage:

No leakage is expected, as per AM0023

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

Project emissions result from less than 100% effective repairs. Ex-post leak detection and measurements will determine project activity emissions (the occurrence of re-emerging leaks). No data currently exist on frequency of re-emerging leaks. It is considered unlikely that re-emerging leaks will result in emissions which are greater than 4% of baseline emissions.

E.4. Estimated baseline emissions:

As described in Section B, baseline emissions are derived from the leak rate measurements collected during initial measurements, when all valves will be repaired. A sample representing 2.8% of the flanges and valves covered by the project activity suggest that baseline emissions are 824,223 tonnes/year of CO_2 equivalent (see Section A.4.3.1).

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

In order to keep the emission reductions estimates conservative it is assumed that they will be 4% lower than the ex-ante calculations of baseline emissions, which are 791,000 tonnes CO_2 equivalents per annum once all initial repairs are done.

The estimated GHG emissions by sources over the 12 year crediting period are:

CH_4 sources: 8,701,000 tonnes of CO_2 equivalents. 3,955,000 tonnes of CO_2 equivalents are ERUs for the period 2008 to 2012, and 791,000 tonnes of CO_2 equivalents are AAUs for 2006 and 2007 and 3,955,000 tonnes of CO_2 equivalents are credits being sought for emissions reductions from 2013 to 2017.

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

Year	Estimated project emissions (tonnes of CO2 equivalent)	Estimated leakage (tonnes of CO2 equivalent)	Estimated baseline emissions (tonnes of CO2 equivalent)	Estimated emission reductions (tonnes of CO2 equivalent)
2008	32,969	0	824,223	791,000
2009	32,969	0	824,223	791,000
2010	32,969	0	824,223	791,000

2011	32,969	0	824,223	791,000
2012	32,969	0	824,223	791,000
2013	32,969	0	824,223	791,000
2014	32,969	0	824,223	791,000
2015	32,969	0	824,223	791,000
2016	32,969	0	824,223	791,000
2017	32,969	0	824,223	791,000
Total (tonnes of CO2 equivalent)	**329,690**	**0**	**8,242,230**	**7,910,000**

SECTION F. Environmental impacts

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

The project does not require infrastructure or equipment that would yield any substantial local or regional environmental impacts. The result of the project, reduced emissions of $CH_{4,}$ represents a reduction of risks particularly associated with indoor leaks.

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

The project activity is not considered to result in any significant environmental impacts.

SECTION G. Stakeholders' comments

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

Since the project is considered to have no negative environmental or social impacts, no local stakeholder involvement has been conducted. The authorities in Tula have expressed strong support for the project.

Annex 1

CONTACT INFORMATION ON PROJECT PARTICIPANTS

Organization:	Russian Carbon Fund Aps
Street/P.O.Box:	Dampfaergevej 3, 5th Fl.
City:	DK-2100 Copenhagen
Country:	Denmark
Telephone:	+ 45 3536 5300
FAX:	+ 45 4555 5005
E-Mail:	info@russiancarbonfund.com
URL:	http://www.russiancarbonfund.com/
Represented by:	Morten Prehn Sorensen
Title:	Director
Last Name:	Sorensen
Middle Name:	Prehn
First Name:	Morten
Direct tel:	+45 2168 8002
Personal E-Mail:	mps@russiancarbonfund.com

Organization:	OJSC Rosgazifikatsiya
Street/P.O.Box:	Tscherbakovskaya Street, Building 41A
City:	Moscow
Country:	Russian Federation
Telephone:	
FAX:	
E-Mail:	office@cgazs.ru
URL:	
Represented by:	Valentine Izbitskich
Title:	
Last Name:	Izbitskich
Middle Name:	
First Name:	Valentine
Direct tel:	
Personal E-Mail:	

Organization:	Centergazservice-opt, LLC
Street/P.O.Box:	Tscherbakovskaya Street, Building 41A
City:	Moscow
Country:	Russian Federation
Telephone:	
FAX:	
E-Mail:	office@cgazs.ru
URL:	
Represented by:	Sergey Vasiliev
Title:	General Director
Last Name:	Vasiliev

Middle Name:	
First Name:	Sergey
Direct tel:	
Personal E-Mail:	svasiliev@cgazs.ru

Organization:	OJSC Tulaoblgaz
Street/P.O.Box:	5-A Morisa Toresa str.
City:	300012 Tula
Country:	Russia
Telephone:	(4872) 331011
FAX:	(4872) 367473
E-Mail:	office@tulaoblgaz.ru
URL:	http://www.tulaoblgaz.ru/
Represented by:	Popov Nikolay Kuzmitch
Title:	General Director
Last Name:	Popov
Middle Name:	Kuzmitch
First Name:	Nikolay
Direct tel:	(4872) 331011
Personal E-Mail:	office@tulaoblgaz.ru

Annex 2

BASELINE INFORMATION

This annex consists of two sections:

- The first present an overview of baseline leak detection and maintenance activities of Tulaoblgaz
- The second explains how baseline leaks are estimated and makes the argument that these estimates provide a basis for conservative calculations emission reductions

It should be underlined that calculation of baseline emissions to be used for calculations of emission reductions will only be available during project implementation (prior to repair).

1. Baseline inspection and maintenance activities

The Tulaoblgaz pipeline system

Natural gas is typically delivered to customers through a pressurized pipeline. The main transmission pipelines move millions of cubic meters of gas from gas production sites. The Tulaoblgaz pipeline operates a medium and low pressure gas distribution system with an annual gas throughput of 3.2 -3.7 billion cubic meters (bcm) in recent three years.

The supply system covers approximately 9000 km of pipes most of which is placed on the ground. There are 920 gas distribution points, and 1,590 cabinet type distribution points (in total 2,510 sites) which contain 22,940 valves and approximately 62,008 flanges. These numbers includes valves belonging to both underground and on ground pipelines, but this JI project does not include underground valves and flanges. Additionally, there are 6,365 valves standing alone, all of which is located on the ground.

There are two main sources of leaks in the Tulaoblgaz network – cracks/breaks in the pipeline; and leaks from valves and flanges at gas distribution point and cabinet type distribution points plus from stand alone valves, most notably from valve stem packings. Because cracks and breaks occur randomly, the one primary and systematic method of controlling leakage is to target leaks from distribution points which are in know locations. Because it is extremely cost-ineffective to survey every meter of a 9000 km wrapped pipeline to locate breaks and cracks the only other alternative for reducing methane loss is to concentrate on a more systematic appraisal, which means assessing valves and flanges. By reducing loss at these points there will be a substantial reduction in GHG emissions.

Leak detection

Inspections to detect leaks should according to industry standards (No. 153-39.3-051-2003) be carried out once a month at distribution points within the cities and once every six months outside the city. Tulaoblgaz leak detection activities are compliant with this requirement. In fact, for safety reasons, points considered being weak points in the system are subject to leak detection more often than required by regulation. Records on leak detection inspections are kept by Tulaoblgaz.

External enforcement of the industry standard prescribing the frequency of leak detection to be carried out by gas distribution companies is made up by annual control check by the Technical Inspection, a regional company operating on behalf of state authorities.

Leaks are detected because of the odour and/or knowledge of some activity that would likely cause leakage (as with some type of construction or accident etc) and/or through applying leak detection devices, however, without the possibility of actually measuring the leak rates. Prior to the first leak rate measurements done in May 2006 as part of this JI project there have not existed any reliable estimates of leak rates.

Different leak detection devices are currently used by Tulaoblgaz. They all have micro pumps to suck the air, all measure the percentage of methane in the air near the gas pipelines and equipment. If the percentage is high (over the allowable limits) they indicate it by sound, light or by quantitative indication of the percentage of methane in the air.

Maintenance

Gas leaks are not prohibited and regulation does not contain any requirements that prescribe a particular repair or maintenance routine apart from the above mentioned requirements regarding frequency of inspections at distribution points.

Tulaoblgaz maintenance routine of valves and flanges imply that once detected, leaks are attempted repaired more or less immediately unless finalisation of repair has to await shutting off the gas either due to safety risks or in order not to disrupt the gas supply to consumers e.g. during winter time. The maintenance routine is primarily targeted renewal of sealing material whereas replacement of broken valves only takes place randomly and only if a detected leak is considered being due to valve brake/crack. Expected operational lifetime of valves is 40 years and there exists no valve systematic programme to replace valves and prevent leaking due to cracks.

Repair material

The main material that is used at the valves is a gas pipeline packing consisting of a round twisted cord made of flax soaked with oil, graphite and asbestos. The filling (oil, graphite and asbestos) is about 35% - 60% of total cord weight. The material loses containment after pressure variations and under the influence of weather changing.

Initially the cord is elastic because of the oil and the cord fills all holes between rod and valve walls. After some period of time (approximately 1-2 months) the cord dries out but it is still vapour-proof until the rod is adjusted when regulating pressure. After this the packing need to be replaced because of lack of containment.

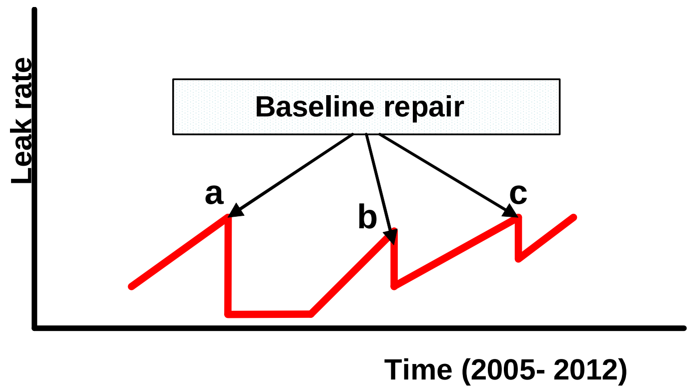
Elastic oil and gasoline resistant rubber and paronite (compressed asbestos gaskets) are used at the flanges. It is used as a sealing material at the flanges (approximately at 90% of flanges in the system). Paronite (compressed asbestos gaskets) is also used at the flanges (approximately at 10% of the flanges). The main difference from elastic oil and gasoline resistant rubber is that this material is more elastic, has lesser residual deformation and is more resistant to changing weather conditions.

2. Estimates of baseline emissions

In order to describe the baseline and the project activity scenarios and analyse why emissions in the baseline scenario would likely exceed emissions in the JI project activity scenarios it is useful to distinguish between two categories of components:
Categories of components

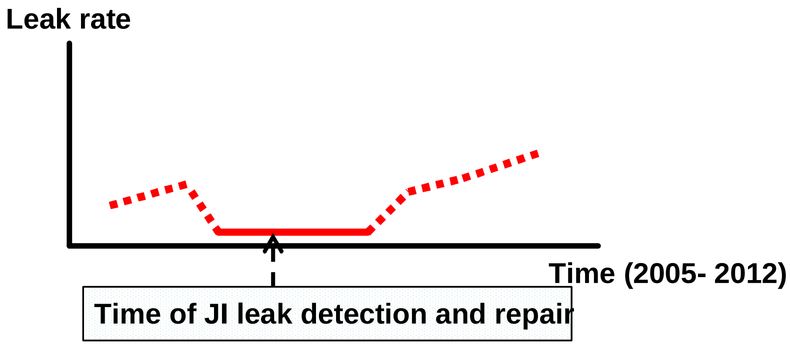
Category 1: Components (i.e. valves and flanges) where leaks are detected and measured as part of the JI project activity. Data from the survey done from May to October 2006 suggest that nearly 1/5 of all valves to be covered by this project will belong to this category. In the baseline scenario these components typically will have a cyclical development in leak rates, with rates increasing in response to temperature and pipeline pressure changes (late fall and in the spring). The regular baseline inspections will detect the leaks and they might be repaired, however, usually only with temporary effect. Figure 2.1 illustrate this development path, with hypothetical baseline repairs done at *time a***,***b and c in the figure.*

Figure 2.1 Category 1: Typical baseline leak pattern for component where leak is detected during JI project repair



Category 2: Components where no leaks are detected as part of the JI project activity. Data from the survey done from May to October 2006 suggest that about 4/5 of all valves to be covered by this project will belong to this category. They are, as stated in section A and B of the PDD, repaired as part of the JI project activity, despite the absence of detected leaks. These components might have had leaks in the past and leaks might appeare in the future in the absence of the JI project activity.

Figure 2.2 Category 2: Typical baseline leak pattern for component where leak is not detected during JI project repair



These patterns as schematically presented in above illustrations can help to understand how the measured leaks and leak reductions (as a result of the project activity) are compared to the actual or "true" leak reductions over the crediting period of the project.

Conservative estimate of emissions reductions

The actual leak reduction cannot be measured for two reasons:

- Detection of leaks are not done continuously but only with certain time intervals as described in the Monitoring Plan (Annex 3)
- Baseline leaks are by their nature hypothetical and cannot be measured.

It is therefore important that the approach taken in calculation of baseline and project activity emissions and the ensuing emission reductions is conservative (meaning that the calculated emissions reductions are likely to be lower than the actual). The following approach for calculating emission reductions is applied:

Baseline emissions (TBE): Emissions measured before leak repairs[6] (measured in volume per minute) multiplied with the number of minutes of the crediting period. This means that the measured baseline leak rate is assumed to stay constant over the crediting period.

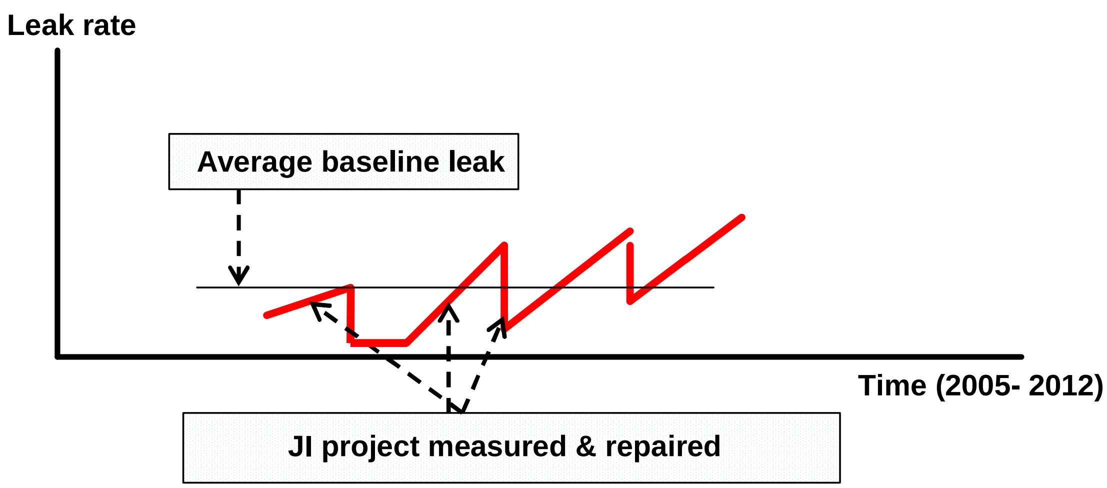
Project activity emissions (TPE): Emissions measured after repair (measured in volume per minute). It is expected that few, if any, leaks will be detected after repair (leak rate=0). However for the case that leaks re-emerge the measured leak rates will be considered to have remained at the measured level since the day after the most recent inspection or repair.

This way of calculating emission reductions (TRE=TBE-TPE) is conservative for the following reasons:

[6] Note that all valves will be repaired

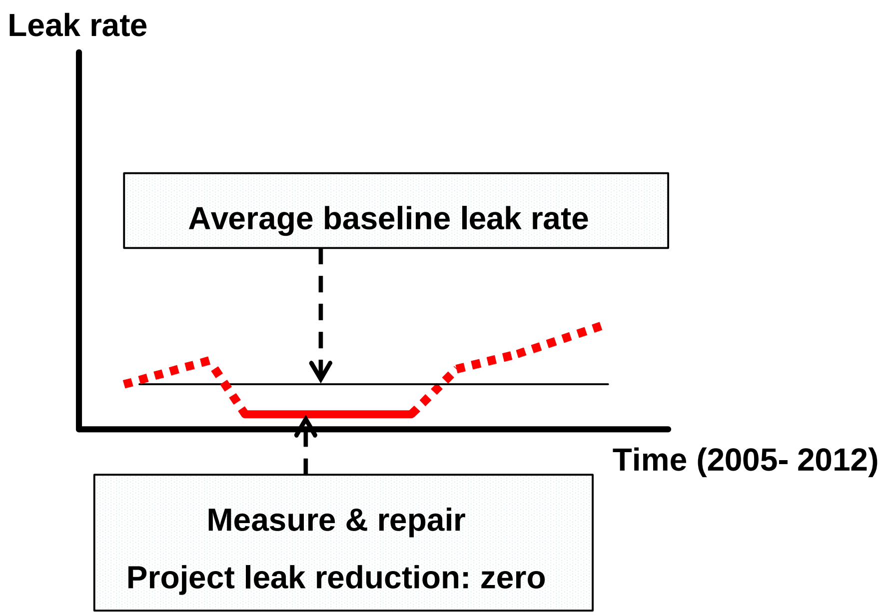
Category 1 components typically have baseline leaks that increase and drop as baseline maintenance/repair result in temporary reductions in leak rates (or they may drop temporary as the pressure is reduced in the summer season). Baseline repairs tend to be done when leak rates are high (when leaks are more easy to detect) whereas repairs in the project in the JI project is done sequentially during the summer period. Leak rates measured and recorded just prior to JI project repair can therefore be expected to be lower than the average leak rate over time for the relevant component.

Figure 2.3 Category 1: Calculated baseline and project emissions



Category 2 components do not have leaks when inspected and repaired, as part of the JI project activity, are done. It is likely that some of these components have had leaks in the past and might have had leaks in the future absent the JI project repair. Since no emission reductions are accounted for among these repairs they probably represent a sizable underreporting of actual emissions reductions achieved by the project activity.

Figure 2.4 Category 2: Calculated baseline and project emissions



In summary, the approach to determine baseline leaks rates results in a conservative estimate of emissions reduction because :

i) the baseline leak rate measurements are done in the summer season when leak rates typically are lower

ii) all valves are repaired irrespective of detected leaks hence preventing potential (baseline) leaks that are not accounted for in the calculation of emissions reductions.

Annex 3

MONITORING PLAN

1. Procedures
As described in the PDD, all leaks will be repaired during project implementation. Subsequently, the monitoring plan will be implemented to ensure that the integrity of the leak repairs is checked annually.

Monitoring for re-emerging leaks

1. Every component repaired under the JI project activity will be given a unique serial number, which will be painted on the component and recorded with a digital photo of the component and number
2. A record with all relevant information for each repaired component will be stored in a database, including photographs with display of leak rates etc. (see below).
3. Every component repaired under the JI project will be inspected by the JI monitoring team at least once every year using the catalytic oxidation/thermal conductivity detectors. These inspections will be in addition to routine equipment inspections conducted by Tulaoblgaz staff.
4. If no re-emerging leak is detected, the JI monitoring team will take a digital photo of each component (including a time stamp) that shows the serial number and the leak detector read out documenting no leak. This digital photo, along with the date, time, serial number of component, and details of the inspection time, will be recorded in the database.
5. If there is a re-emerging leak detected, the JI monitoring team will take a digital photograph of each component that includes the serial number and the leak detector read out, and move to the "Repair of re-emerging leaks" procedures

Note that regular inspection of distribution points by officials from Tulaoblgaz will also continue in compliance with Industry Standard OCT 153-39.3-051-2003 i.e. at least every month for distribution points located within cities and at last every six month for distribution points located outside cities. This is another team than then JI monitoring team. In the event that the regular inspection team detect a leak, they will immediately notify the JI monitoring team, and the JI monitoring team conduct the procedures described below for repair of re-emerging leaks. In other words, re-emerging leaks may be identified either through the JI monitoring team inspections or as part of the routine inspections of distribution points.

Repair of re-emerging leaks

1. Where a leak has been detected, the JI monitoring team will use the Hi-Flow Sampler to measure the leakage rate. Leak detection and measurement may not happen on the same day, because the Hi-Flow Sampler is not brought out to the sites during inspections for leaks.
2. Each leak will be measured twice with the High-flow Sampler. Both leak rates will be recorded. If the two measurements deviate by more than 10% it normally indicates a human error and the measurements are being stopped. The measurement team will reposition and start the test over again. If the two measurements deviate by less than 10%, the higher one will be used for the purpose of calculating project emissions.
3. A digital photo will be taken of the component, serial number, and High-Flow Sampler reading.
4. The leak will then be repaired by the JI monitoring team
5. Once the leak has been repaired, the component will be inspected again using catalytic oxidation/thermal conductivity detectors to ensure that the repair has been effective. A digital

photo (including a time stamp) will be taken of the component, serial number, and the detector read out.

6. All information on these events will be recorded in the database.

Monitoring of enforcement of existing regulations and new regulations

The enforcement of Government Regulation No 344 and other new regulation that could affect additionality of the project will be monitored. This will be done by Centergazservice-opt and included in the regular monitoring reports.

Picture 3 Measurement of leak rate

2. Management of monitoring

Monitoring team

Tulaoblgaz has formed a JI monitoring team trained by Centergazservice-opt, to identify and repair the leaks and to monitor leaks that have been repaired. Centergazservice-opt is overall responsible for the monitoring plan and supervision of Tulaoblgaz' implementation of the monitoring plan.

Centergazservice-opt and Tulaoblgaz are developing detailed instructions and guidelines for leak detection, repairs and leak measurements. The guidelines and instructions will be amended and improved based on experience from implementation in Tula as well as similar JI project activities in other regions.

The training of Tulaoblgaz staff has already started in 2006. A special training session was organised in February where Health Consultants "trained trainers". Staff from 'GasEnergotechnolog' (company that will be engaged for performing measurements in gas distribution companies) has been certified by Heath Consultants to train users of the Hi-Flow sampler.

Calibration

An important part of the use of the Hi-Flow Sampler is to check the proper functioning and calibration of the equipment. Calibration Kits and spare part kits are delivered with Hi-Flow Sampler package purchased for use in Russia. The Hi-Flow Sampler has been certified for use in Russia by the Russian gas industry research institute 'GiproNiiGas'.

Procedures for checks and calibration of the Hi-Slow sampler follow the procedures defined by the provider, including:

- Every day before use the Hi-Flow sample is check with a standard gas balloon with a preset percentage of methane concentration (one from calibration kit). With indication of errors (deviation of more than 10%) that Hi-Flow Sampler must be recalibrated.

- Every month the Hi-Flow Sample will be recalibrated with all balloons from calibration kit and performed by certified staff from "GasEnergotechnolog"

The manufacturer of the leak detector (Heath Gassurveyor series) requires the device to be calibrated at least once every year under normal operating conditions. Tulaoblgaz will institute calibration validity of the detectors at least once every week following the same procedures as for the Hi-Flow Sampler.

Monitoring reports, quality assurance and corrective action

Tulaoblgaz will keep Centergazservice-opt and Russian Carbon Fund informed about progress in monitoring and repairs of re-emerging leaks. At the end of each monitoring period a draft monitoring report will be prepared for review and approval by the Head of Quality Inspection Service at Tulaoblgaz. Subsequently, Tulaoblgaz will submit the report to Centergazsservices who will review and comment on the report in consultation with GasEnergotechnolog.

The quality assurance measures include procedures to handle and correct non-conformities in implementation of the Monitoring Plan. In case such non-conformities are observed:

- An analysis of the nonconformities and its causes will be carried out immediately.
- The management of Tulaoblgaz will make a decision, in consultation with Centergazservice-opt, on appropriate corrective actions to eliminate the non-conformity and its causes.
- Corrective actions are implemented under the supervision of the Head of Quality Inspection Service at Tulaoblgaz, and required amendments are made to operational manual etc.
- All relevant information on non-conformities and subsequent analysis and corrective actions are presented in monitoring reports.

3. Data storage

All data are compiled and stored in a database (Excel spreadsheets). This includes serial numbers, dates of monitoring and repair, results of all monitoring based upon written forms filled out during implementation and electronic records from the HI-Flow sampler as well as hyperlinks to supporting photographs of all components.

For each component subject JI project activity repair the database will contain the entire history of leaks, repairs and monitoring according to the principles presented above. The database will allow for review of the essential data used to calculate the emissions reductions including leak rates (in litres per minutes) and the time (data, hour and minute) when a measurement and repair was done and documented according to the procedures presented above.