MONITORING REPORT

Associated Gas Recovery Project for the Komsomolskoye Oil Field

OJSC “NK-ROSNEFT”, ROSNEFT-PURNEFTEGAZ
Monitoring period: December 1, 2011 – February 29, 2012
Date of preparation: May 24, 2012

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Version 3.0 from May 24, 2012

Associated Gas Recovery Project for the Komsomolskoye Oil Field
Monitoring Period Number 01
December 1, 2011 – February 29, 2012

SECTION A. General description of the project activity

A.1. Brief description of the project activity:

The purpose of the *"Associated Gas Recovery Project for the Komsomolskoye Oil Field"* (the JI project), operated by a subsidiary company of the OJSC "NK-Rosneft" – "RN-Purneftegaz", is to recover, treat and market low-pressure (LP) associated petroleum gases (APG) produced at the Komsomolskoye oil field, thereby reducing flaring of APG at the oil field and emissions of GHG to the atmosphere.

At the Komsomolskoye oil field, operated by RN-Purneftegaz, oil and associated gas (APG) are being produced. Oil and gas from the production wells is transported through pipelines (approximately 5 to 7 km, depending on location of the well site) to a preliminary water removal unit (PWRU), where oil and APG are separated. The PWRU was built in January 2008 and contains 3 flares.

Historically, oil has been directed to the processing and consumption locations and the APG has partially been directed to the Gubkinskiy Gas processing Plant[1] (GGPP) through an 18 km pipeline (~950 MM m^3 per year) or utilized for onsite consumption (only ~3%), while the rest has been flared at the PWRU (> 500 MM m^3 per year). The demand for APG from the Gubkinskiy GPP is fixed (capped by the installed capacity of the processing units) and unreliable, since this plant has been working over capacity and during several planned and unplanned shutdown periods has being leading to substantial APG flaring at Komsomolskoye.

The oil production of the Komsomolskoye field is increasing and is expected to continue to do so. Increasing amounts of oil and APG are thus transported to the PWRU. The pressure in the oil and gas gathering infrastructure that is connecting the well sites to the PWRU is thus increasing as well. In absence of the JI project, the pressure can only be released through increased flaring of APG (otherwise production levels at the well sites will be negatively affected). While the release of pressure through flaring of the APG allows maintaining a constant pressure at the oil and gas gathering infrastructure and at the PWRU inlet, it leads to a decrease in pressure at the outlet of the PWRU. In order to continue supplying the *GGPP* with APG through the 18 km pipeline, RN-Purneftegaz considered building an APG booster compression station (BCS_B) to ensure that the delivery pressure of APG that can be supplied to GGPP would meet the requirements (minimal pressure at the intake point of GGPP is 0.09 MPa). Due to the significant and increasing volumes of APG produced at the Komsomolskoye field and the limited and unreliable demand for APG at GGPP, construction of this BCS_B would only allow a partial solution in terms of productive utilization of APG.

In face of these circumstances, RN-Purneftegaz made a decision to install a different type of APG booster compressor station (BCS) after the PWRU that would allow complete recovery and utilization of APG produced at the Komsomolskoye field. This investment, known as the "Associated Gas Recovery Project for the Komsomolskoye Oil Field" (the JI project), is presented in detail in the determined JI PDD referred to in Section B.1, including its rationale and a detailed justification of its JI eligibility. The JI project activity comprises installation of facilities that enable recovery, compression and treatment (dehydration) of the APG and production and transportation of (i) dry gas through a new

[1] The GGPP is under the control of the *Sibur Petrochemical Group*, which is a subsidiary of *Gazprom Group*.

5.434 km pipeline for sale into Gazprom UGSS and (ii) a small fraction of C_3+ (denoted LPG in this manual) to the PWRU's oil treatment unit to be added to the oil products from the Komsomolskoye field.

In absence of the JI project, a large portion of the APG produced at the oil field would continue be flared due to limited marketing opportunities, while alternative supplies of natural gas and oil products would be directed to meet the demand of final consumers. The overall purpose of the JI project is to enable complete recovery and utilization of APG from the Komsomolskoye oil field to reduce flaring to an operational minimum, thereby displacing the consumption of alternative energy products that could be produced to meet the same needs and thus reducing global GHG emissions to the atmosphere.

Installed technologies and equipment:

See Section A.4 for further details.

Total emission reduction achieved in this monitoring period

During Monitoring Period No. 01 (from December 1, 2011 to February 29, 2012), the net emission reductions achieved is calculated to be **249,467 tCO_{2e}** in accordance with the formulae presented in Section E. More detailed data for each month are presented in Section E.4.

A.2. Project Participants

The "Project Developer" for the project activity is OJSC "NK-Rosneft". Project operator is a subsidiary company of the OJSC "NK-Rosneft" – "RN-Purneftegaz".

Name of Party involved	Private and/or public entity (ies) project participants (as applicable)	The Party involved wishes to be considered as project participant (Yes/No)
Russia (host)	OJSC "NK-Rosneft"	No
Denmark	International Bank of Reconstruction and Development (IBRD) as the Trustee of the Danish Carbon Fund	Yes

A.3. Location of the project activity:

Gubkinskiy City, West Siberia, Tumen Oblast, Yamal-Nenets Autonomous District, Russian Federation

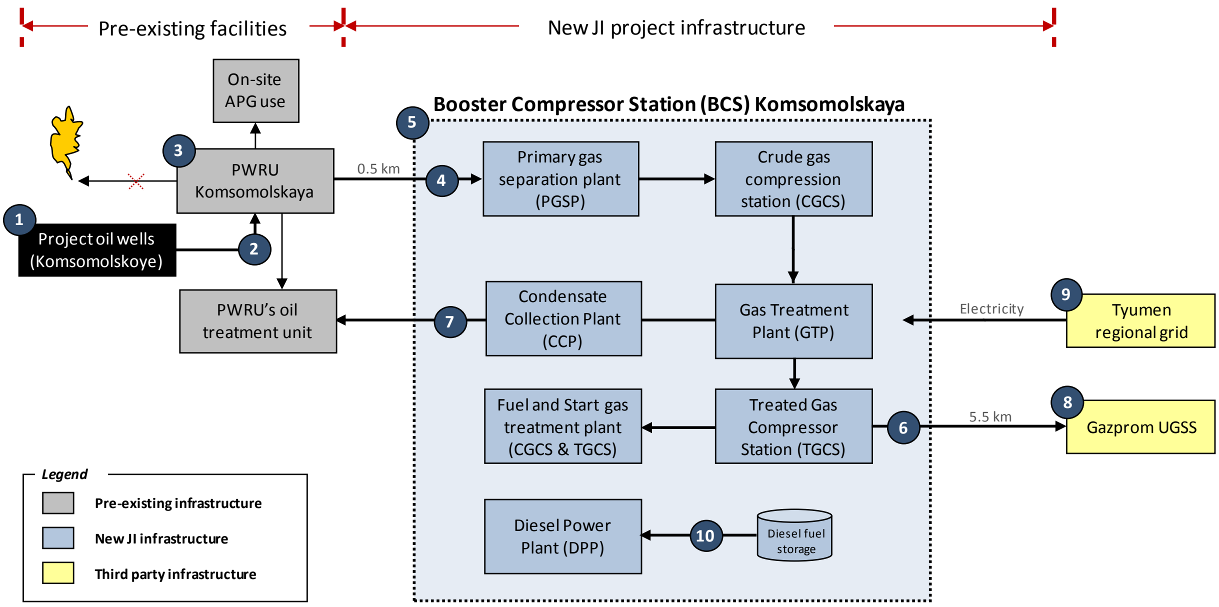
Gubkinskiy is a city in Yamal-Nenets Autonomous Okrug, Russia, located on the left bank of the Pyaku-Pur River, south of Salekhard. Coordinates for Gubkinskiy are: 64°26′N, 76°30′E

Figure 1. Map of the Russian Federation indicating the location of the Komsomolskoye Oil Field

A.4. Technical description of the project

The JI project activity comprises installation and/or operation of a number of facilities on production, preparation, processing and delivery of APG. The main components of the JI project are illustrated in Figure 2.

Figure 2: Project activity scheme with indication of main components related to the JI project



With reference to Figure 2, the main components of the JI project are:

1. ***Production of APG at the Komsomolskoye oil field (No.1 in Figure 2)***

APG is produced in association with oil (and water) at oil wells within the Komsomolskoye oil field. The APG produced is comingled with oil and water in the well streams, which are gathered at various well facilities (groups of wells) within the field. Each group of wells producing to a common manifold includes 5 to 16 wells.

2. ***Transportation of well production streams (oil, APG and water) to the PWRU (No.2 in Figure 2)***

The production streams at well facilities within the Komsomolskoye field is gathered and transported to the preliminary water removal unit (PWRU), which is located approximately 5 to 7 km away from each group of wells (depending on the site location).

3. ***Separation of APG at the PWRU***

At the PWRU, water, oil and APG are separated. The PWRU built on-site in 2008 is used by the JI project activity with no modifications.

4. ***Recovery of excess APG from the PWRU and supply to the BCS (No.3 in Figure 2)***

At the outlet of oil separation plant at the Komsomolskoye field PWRU, minor portions of the separated APG is directed to other facilities for internal consumption and to the flares at the PWRU, while the remaining portion is recovered and supplied to the new “Booster Compressor Station Komsomolskoye oil field” (BCS) through a new, dedicated 357 meter pipeline at its own pressure (0.25-0.35 MPa).

5. ***The BCS used for treatment of APG and production of dry gas and LPG (No.5 in Figure 2)***

The BCS comprise gas compression, treatment and processing facilities to recover and market APG in the form of dry gas and LPG, various metering systems, as well as auxiliary systems and plants to ensure operation of the process equipment.

Primary Gas Separation Plant (PGSP)

The recovered APG is supplied to the Primary Gas Separation Plant (PGSP) (No.4 in Figure 2) where the gas is cleaned from free liquid. The APG inflow stream to the BCS is measured by Gas Metering Unit # 1 and 2 (GMU-1 and GMU-2, included in the PGSP).

Crude Gas Compression Station (CGCS)

The cleaned APG is supplied from the PGSP to the inlet of the Crude Gas Compressor Station (CGCS). At the CGCS, the APG is compressed by turbocompressor units (TUs, three in operation + one stand-by), fitted with gas turbine engines (GTEs) of 16 MW capacity each, from an inlet pressure of 0.2 MPa to 5.5 MPa, and is supplied to the Gas Treatment Plant (GTP).

Process measurements of APG supplied to the compression sections of the CGCS compressor units are envisaged for the purpose of anti-surge control of compressor operation.

Gas Treatment Plant (GTP)

The gas treatment (as per sectoral standard STO Gazprom 089-2010 requirements) is carried out at the GTP via low-temperature separation (LTS) with the use of Joule-Thompson effect as well as triple-flow vortex tubes (TVTs). Gas Metering Unit # 5 (GMU-5, included in facility 5 on the general layout) is envisaged for process measurements of APG flows at the inlet and outlet of the GTP.

Treated Gas Compressor Station (TGCS)

From the GTP outlet, the treated gas (at a pressure of 2.0 MPa) is supplied to the Treated Gas Compressor Station (TGCS). At the TGCS, the APG is compressed by turbocompressor units (TUs, two in operation + one stand-by), fitted with GTEs of 16 MW capacity each, up to the pressure of 7.55 MPa.

Process measurements of APG supplied to the compression sections of the TGCS compressor units are envisaged for the purpose of anti-surge control of compressor operation.

Condensate Collection Plant (CCP)

Natural gas liquids (denominated LPG under the JI project) produced during the APG treatment process (i.e. in the GTP) are supplied via the Condensate Collection Plant (CCP) to the operating process system for oil treatment at the PWRU of the Komsomolskoye field (No.7 in Figure 2).

Auxiliary systems and plants

The BCS envisages auxiliary systems and plants to ensure operation of the process equipment:

- High- and Low-Pressure flaring systems
    - HP systems: for discharge of gas to the flare in case of any BCS stoppages, for emergency discharge to the flare if any safety devices trigger;
    - LP systems: for discharge of gas to the flare in case of any BCS stoppages, for emergency discharge to the flare if any safety devices trigger;
- A fuel and start gas treatment plant;
- A mineral oil facility (to supply mineral oil to compressor units);
- An air supply plant for the compressor units and process equipment of the BCS;
- A methanol facility for supply of hydrate inhibitor (methanol) to the APG treatment circuit using the LTS methodology; collection and pumping of GTP water-methanol solution (WMS) to mobile vehicles to transport it to the operating methanol regeneration plants of RN-Purneftegaz;
- A fire alarm, gas monitoring and fire extinguishing system;
- A diesel power plant (DPP-1) to supply electricity to the fire pump station in case of any emergency electricity shutdown. Metering packaged devices at the diesel fuel storage reservoirs is installed to measure the diesel fuel supply to the DPP (No.10 in Figure 2);
- A diesel power plant (DPP-2) to supply electricity to the commercial gas metering unit in case of any emergency electricity shutdown;
- Utility systems (electricity supply, communications, water supply, sewerage, heating system) and control systems of metering units. Measurements of electricity imports from Tyumen regional grid is done by electricity meters at packaged transformer substations (No.9 in Figure 2)

An automated process control system (APCS) is installed for the BCS production facility.

6. *Transportation and metering of APG (dry gas) from the BCS to Gazprom UGSS*

From the outlet of the TGCS at BCS Komsomolskaya, a minor portion of the treated APG is delivered to the Fuel and Start Gas Treatment Plant that supplies the BCS facilities (TUs) with fuel while the remaining portion (No.6 in Figure 2) is injected into a new 530mm ND 5.5 km long gas pipeline to the main gas pipeline of the Gazprom Unified Gas Supply System (UGSS) at a pressure of 7.5 MPa.

The supply of saleable APG (i.e. dry gas) from the BCS is measured in the Treated Gas Metering Unit # 6 (GMU-6).

7. *Metering, transportation and delivery of LPG to PWRU's oil treatment unit*

The LPG produced during treatment of APG in the GTU/BCS is piped (by its own pressure) at the CCP. The amount of liquid is calculated based on the measurements of the luquids' level in the LPG tank using gauge meter.

8. *Delivery and sale of APG (dry gas) to Gazprom UGSS*

The gas delivered and sold to Gazprom UGSS shall meet the requirements of Gazprom standard ST) 089-2010.

A unit to carry out commercial metering (No.8 in Figure 2) of RN-Purneftegaz Komsomolskoye field gas is envisaged right before the connection to the Gazprom UGSS.

9. Electricity imports from Tyumen regional grid

Measurements of electricity imports from Tyumen regional grid is done by electricity meters at packaged transformer substations.

10. Diesel fuel consumption at diesel power plants (No.10 in Figure 2)

Metering packaged devices at the diesel fuel storage reservoirs (vessel level meters) are installed to measure the diesel fuel consumption at the Diesel Power Plants (back-up generators).

A.5. Title, reference and version of the baseline and monitoring methodology applied to the project activity:

The baseline for the JI project activity is established on a project-specific basis with respect to the requirements of the JI guidelines as specified in the *"Guidance on criteria for baseline setting and monitoring (version 01)"*. In doing so, the elements of approved CDM baseline and monitoring methodology AM0009 (version 02.1) *"Recovery and utilization of gas from oil wells that would otherwise be flared"* is applied in combination with elements of the *"Tool to calculate project emissions from electricity consumption"* (version 01/EB32) in accordance with the provisions made in option 20 (a) of the JI guidelines.

A.6. Registration date of the project activity:

The project was approved by the Order # 326 from July 23, 2010 of the Russian Ministry for Economic Development.

The Letter of Approval from Denmark was issued in November 12, 2010.

A.7. Crediting period of the project activity and related information (start date and choice of crediting period):

Crediting period of the project activity: from December 1, 2011 to December 31, 2012.

Crediting period of the project activity starts from the starting date of project operation to the closing date of the first commitment period of the Kyoto Protocol.

A.8. Name of responsible person(s)/entity(ies):

Main contact persons from OJSC "NK-Rosneft":

- Mr. R. Latysh, Director of Department for Economy and Business Planning; Email address: r_latysh@rosneft.ru

Responsible for preparation of monitoring report:

- Ms. T. Korobova, Acting Head of Environmental Protection Unit, RN-Purneftegaz. Contact phone: 8 ((34936) -5-36-23; Email: TNKorobova@purneftegaz.ru

SECTION B. Implementation of the project activity

B.1. Implementation status of the project activity

The project was commissioned on December 1, 2011 (the commissioning act is provided in the Annex 1).

During the monitoring period the project performed in accordance with existing regulation and description in the PDD. There were no special events during project operation.
During the monitoring period 406,990.653 thousand м^3 of raw gas were supplied to BCS from PWRU[2]. The amount of dry supplied to Gazprom has been of 359,791.936 thousand м^3 of dry gas and the amount of produced LPG has been of 9,544 tons.

B.2. Revision of the monitoring plan

The monitoring plan for the JI project, as described in the determined PDD and further elaborated in monitoring manual, has been improved in following aspects leading to enhanced robustness of monitoring and applicability of collected data for emission reduction calculations:

1. **Measurement of the amount of dry gas** is implemented by the meter(s) at the commercial metering station (CMU-40) at the end of the connecting gas pipeline to Gazprom UGSS. The metering station is located immediately before the gas pipeline connection from the BCS to the Gazprom UGSS, at the distance of 5.5 km from the BCS. Three ultrasonic flow meters (in operation/standby/cross-checking) are installed and include temperature and pressure detectors. Any detector readings are transferred to an integrating device.

This approach is more conservative as compared to the currently approved monitoring plan given that some losses may occur in transportation and the amount of gas measured at CMU-40 will systematically be lower than the amount measured at the outlet of the BCS (as in the determined PDD).

2. **The types of metering devices** are clarified and elaborated in the Monitoring Manual and in the excel files on the instrumentation used in monitoring.

3. **Additional metering devices** were installed at the commercial metering station of dry gas (CMU-40), to measure consumption of electricity and diesel fuel that are considered as part of the project emissions (in addition to the sources listed in the PDD) thus improving completeness and conservativeness of calculations.

4. **The organization structure, information flows and monitoring procedures** were further elaborated and improved as compared to the early stage description of the PDD and in accordance to the current organization structure of project operator. These modifications are improving completeness of monitoring plan and are fully reflected in the Monitoring manual (MM) which is formally approved by the RN-Purneftegaz management (in Russian) and is obligatory for implementation (the MM has been provided to the IAE in a separate document).

The following revisions of monitoring plan were implemented (see Figure 3 below):

5. Monitoring of the amount of LPG. In the revised monitoring plan, the amount of LPG produced is calculated based on measurements of LPG level in the LPG tank using gauge meter. In order to ensure conservativeness and in accordance with the principle of the Section B, paragraph 4 a) of the *JI*

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[2] Calculated based on Formulae 16.

Standard for applying the concept of materiality in verifications (Version 01), the discount of 5% is applied to the calculated amount of LPG.

6. Monitoring of the volume of wet gas (APG) supplied to the BCS of Komsomolskoye oil field in point A. The ultrasonic flow meter of the APG at the point GMU-1 on the first line of the pipeline after the PRWU (metering point A) has not being functioning properly. This was due to the presence of high amount of liquid (two-phased mixture). The meter was dismantled, calibrated and tested, but the technical solution was not found.

To resolve this issue the monitoring plan has been revised to incorporate calculation method for monitoring of the amount of APG using a mass balance approach as follows:

(16)
$$V_A = \frac{(V_{BDG,y} + V_{CONSUM BCS,y}) * \rho_{BDG,y} + V_{LPG,y} + V_{FLARES,y} * \rho_{A,y}}{\rho_{A,y}},$$

Where

$V_{BDG,y}$	-	Volume of dry gas (DGS) produced at the BCS and transferred to Gazprom UGSS at point B_{DG} (thousand nm^3);
$V_{CONSUM\_BCS,y}$	-	Volume of fuel and start gas for gas turbine drives of compressor units, gas for ignition and purge gas measured at point CMU-4 (thousand nm^3);
$\rho_{BDG,y}$	-	Density of dry gas produced at the BCS and transferred to Gazprom UGSS at point B_{DG} (kg/nm^3);
$\rho_{A,y}$	-	Density of APG at point A (kg/nm^3);
$V_{FLARES,y}$	-	Volume of APG flared at high and low pressure flares at the BCS (measured at the point GMU-7, thousand nm^3);
$\rho_{A,y}$	-	Density of APG supplied to the BCS at point A (kg/nm^3);
$V_{LPG,y}$	-	Amount of LPG produced at the BCS and transferred to the PWRU's oil treatment unit at point B_{LPG} (tons).

All the parameters used in Formula 16 are measured at the measurement points using duly calibrated devices as described in the section D.2. In the absence of properly functioning flow meter at the point A, this approach is improving applicability of data collected compared to the original monitoring plan.

7. Monitoring of CO_2 project emissions from fuel combustion ($PE_{CO2,\ gas,y}$). According to the revised monitoring plan, the CO_2 project emissions from on-site fuel combustion, leaks, flaring and venting during transport and processing of recovered gas are calculated based on:

- volume of gas consumed for own need (for gas turbine drives of BCS compressor units (including fuel and start gas), gas for flare ignition and purge gas) measured at point CMU-4; and
- amount of gas flared at high and low pressure flares measures at point CMU-7.

(17)
$$PE_{CO2,gas,y} = V_{CONSUM\_BCS,y} * w_{BDG,y} * 44/12 + V_{FLARES,y} * w_{A,y} * 44/12 ,$$

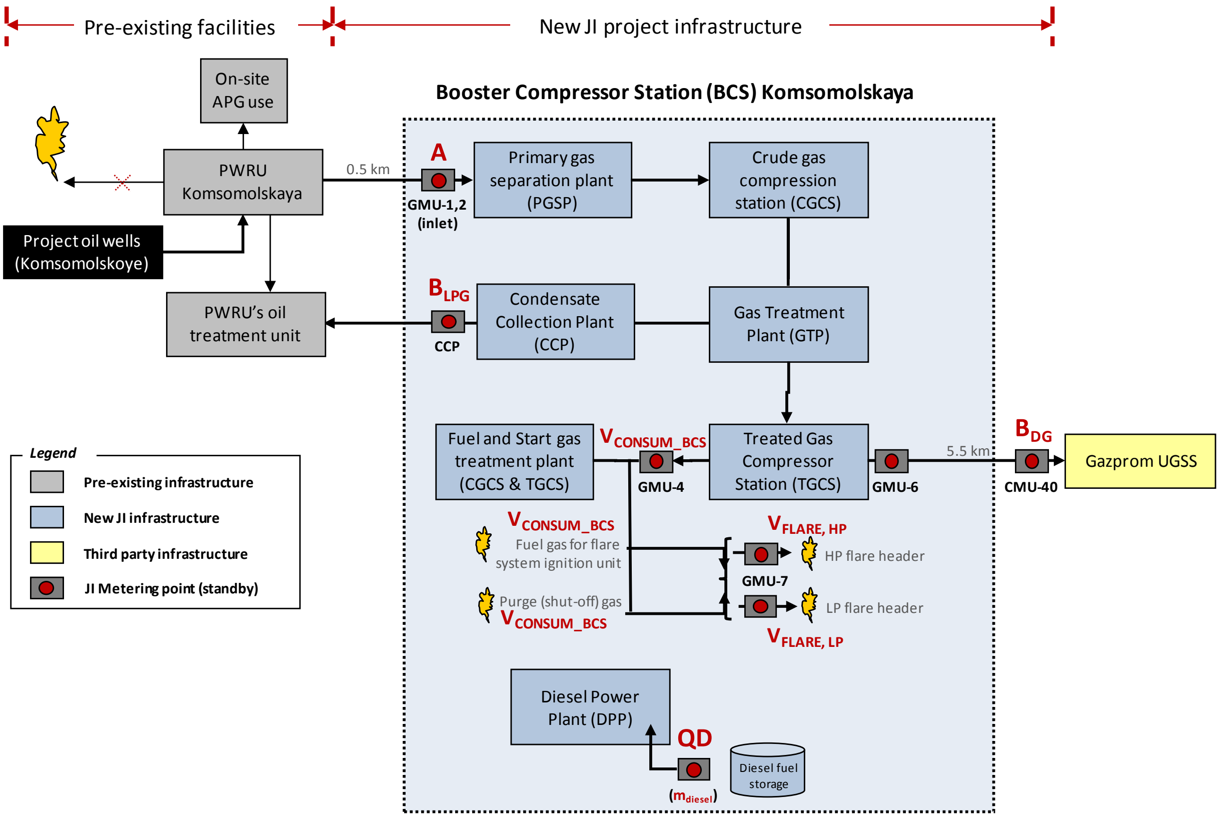
Where

$V_{CONSUM\_BCS,y}$	-	Volume of fuel and start gas for gas turbine drives of compressor units, gas for ignition and purge gas measured at point CMU-4 (thousand nm^3);
$V_{FLARES,y}$	-	Volume of APG flared at high pressure flare ($V_{FLARE,\ HP,y}$) and low pressure flare ($V_{FLARE,\ HP,y}$) at the BCS (thousand nm^3);
$W_{BDG,y}$	-	Average carbon content of dry gas used as fuel for gas turbines (measured at point B_{DG} (kgC/nm^3);
$W_{A,y}$	-	Average carbon content of APG supplied to the BCS at point A (kgC/nm^3).

In the context when the direct monitoring of APG at point A is not available, the formula 17 is substituting the carbon balance approach for the calculation of $PE_{CO2,gas,y}$ used in formula 1 of the PDD. This approach also improves the applicability of collected data.

The revised scheme of the monitoring points is provided on Figure 3.

Figure 3: Location of monitoring points of the project.



8. Monitoring of CH_4 emissions from transport of gas in pipelines when accidental event occurred

The formula (9) presented in the methodology/PDD has been revised/simplified as following to provide meaningful results given that there is no "other" oil wells supplying APG to the BCS of the project:

(9)
$$V_{remain,accident} = d_i \cdot \pi \cdot L_i \cdot \frac{P_P}{P_S} \cdot \frac{T_{S(K)}}{T_{P(K)}},$$

In particular, the component $\frac{V_{A,d,accident}}{\sum_i V_{x_{i,d,accident}}}$ has been removed from the equation (9). In fact, $\boldsymbol{V_{xi,d,accident}}$ that represents the volume of gas supplied to the pipeline from oil well *i* at point *X* in **Error! Reference source not found.** of the PDD, before the accident occurs. This parameter is equal to 0 given that there are no other oil wells supplying gas to the BCS_p. Thus, to maintain the functionality of the formula, this component has been removed.

In the current monitoring period, in the absence of accidents, formulae 7-9 were not applied. However, given that the direct monitoring of the amount of gas is not feasible at point A, a conservative calculation-based approach will be used in case of an accident at the pipeline from the PWRU to the BCS_p based on the revision described in the paragraph 6 above.

9. Calculation of the amount of total project emissions.

The total project emissions are calculated in accordance to the formula (18) which is summing up all the components of the project emissions as reflected in the formula

(18)

$$PE_{Total,y} = PE_{CO2,gas,y} + PE_{CO2,other-fuels,y} + PE_{EC,y} + PE_{CH4,plants,y} + PE_{CH4,pipeline,y} + PE_{CH4,pipeline,accident,y}$$

$PE_{CO2,gas,y}$	CO_2 emissions from the project activity due to combustion, flaring or venting of recovered gas during the period y, in tons of CO_2e
$PE_{CO2,other-fuels,y}$	CO_2 emissions due to consumption of other fuels than the recovered gas due to the project activity during the period y, in tons of CO_2e
$PE_{EC,y}$	CO_2 emissions due to electricity consumption during the period y, in tons of CO_2e
$PE_{CH4,plants,y}$	CH_4 emissions from the project activity at the gas recovery facility and the gas processing plant during the period y, in tons of CO_2e
$PE_{CH4,pipeline,y}$	CH_4 emissions from the project activity during the transportation of the gas in pipelines under normal operating during the period y, in tons of CO_2e
$PE_{CH4,pipeline,accident}$	Methane emissions from the transport pipeline due to an accidental event, in tons of CO_2e

The formula (18) incorporates all the components of the project emissions as reflected in the formula (15) of the finally determined PDD.

SECTION C. Description of the monitoring system

The following four divisions within RN-Purneftegaz are involved in the monitoring and verification of the JI project activity:

1. Two units of the Oil, Gas and Condensate Treatment and Handling Division
    a. Gas Treatment and Compression Workshop #2 (BCS operator)
    b. Production Chemical Analysis Laboratory
2. Chief Metrology Department
3. Power Supply Division
4. Environment Protection Department, Industrial and Labor Safety and Environment Protection Division (coordinating entity for data consolidation and training).

In order to implement the monitoring procedures in the frame of JI project and the RN-Purneftegaz standard "Associated Gas Recovery Project for the Komsomolskoye Oil Field. Monitoring Manual", introduced by Order #2254 from October 14, 2011, the following steps were done:

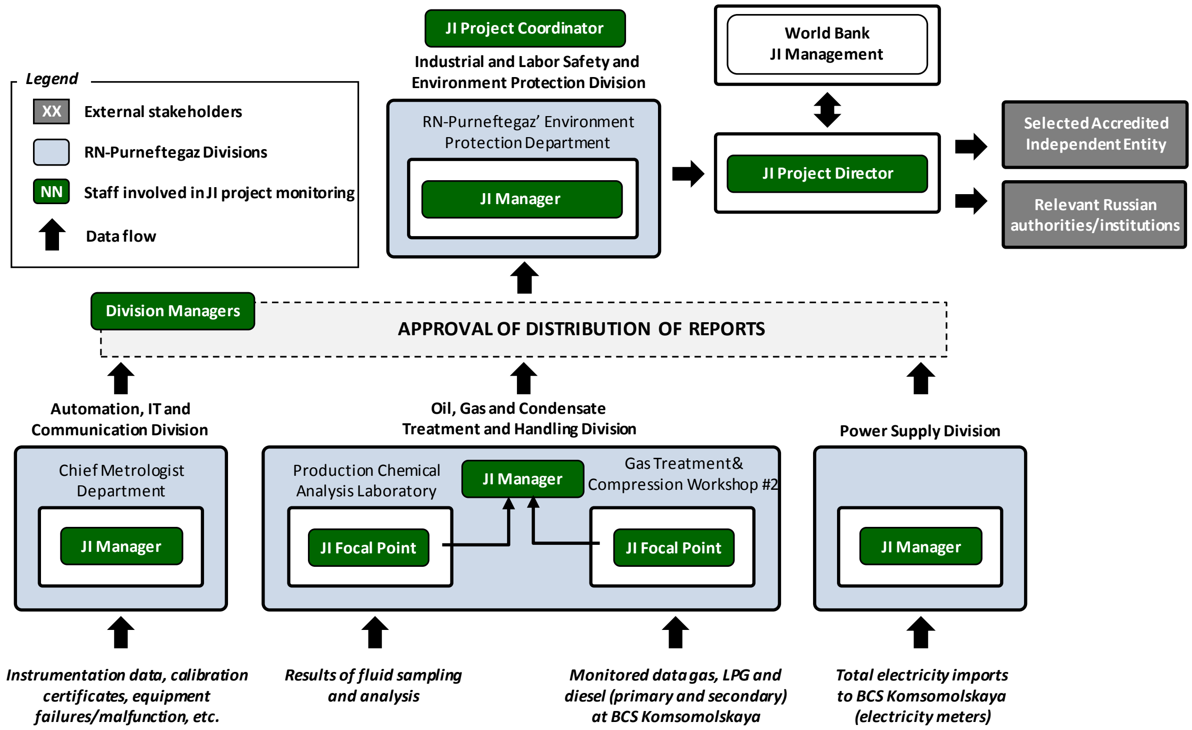
- Directive "About implementation of monitoring procuderues " from October 28, 2011 was issued,
- Training of staff was conducted (Record #1 about training on monitoring procedures in the frame of JI project on Associated Gas Recovery Project for the Komsomolskoye Oil Field).

The Environmental Protection Department (Industrial and Labour Safety and Environment Protection Division) shall coordinate the interaction among all divisions in charge of collecting and transferring primary and standby (back-up) data as required for JI monitoring, manage the consolidation of data records from the various divisions and the periodic calculation of net emission reductions achieved and coordinate training of relevant staff.

JI Project Directors – Mr. R. Latysh, Director of Department for Economy and Business Planning, NK-Rosneft and Mr. N. Elisseyev, Deputy Head of Gas Projects of Rosneft, NK-Rosneft, manage JI project implementation, verification and issuance of ERUs. JI Project Directors coordinate communication with all stakeholders to the JI project activity, both internal and external.

In the following sections, the key functions and responsibilities for all involved organizational units are outlined.

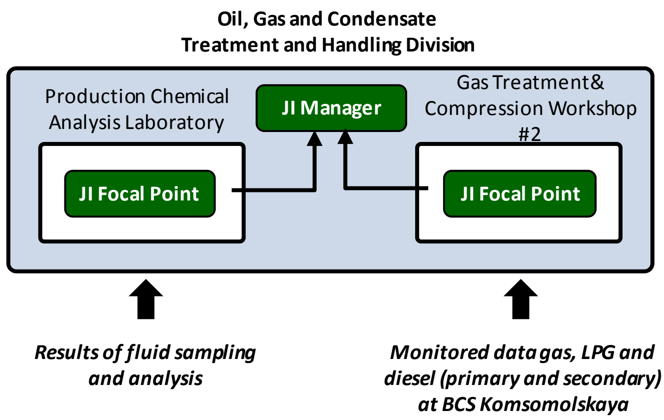
Figure 4: Overall JI Organizational Structure



Oil, Gas and Condensate Treatment and Handling Division:

The Oil, Gas and Condensate Treatment and Handling Division is responsible for collection, compilation, quality assurance, reporting and storage of the bulk of the primary and secondary data required for successful JI monitoring, verification and issuance of ERUs.

Figure 5: Organizational structure of JI monitoring within Division



Mr. Aidar Gabdulhakov, Deputy Head, Oil, Gas and Condensate Treatment and Handling Division was appointed as Production JI Manager to coordinate the JI monitoring activities within the Oil, Gas and Condensate Treatment and Handling Division.

The Production JI Manager has the following responsibilities:

a) Selection, appointment, qualification assessment and training of JI Focal Points for (**i**) the Gas and Condensate Treatment Department and (**ii**) the Production Chemical Analysis Laboratory;
b) Collection and quality review of the completed Excel templates containing monthly data from the BCS JI Focal Point and the Laboratory JI Focal Point and submission of these through the Division Manager (for approval) to the JI Project Coordinator by the 5th day of the following month as described in Section D.8 of the Monitoring Manual;
c) Facilitator of interactions and overall responsible for measures taken by division staff involved in the JI monitoring to replace errors and omissions in the primary data sets.

<u>Gas Treatment and Compression Workshop #2:</u>

The key functions and responsibilities of staff at the <u>Gas Treatment and Compression Workshop (GTCW) #</u>2 are:

- GTCW #2 operators:

  a) Ensure that the monitoring and real time transfer and storage of primary data as required for JI monitoring into the general database is done appropriately. This includes:
     - At BCS Komsomolskaya:
       - Continuous measurement of volume of LPG pumped to oil treatment unit (at CCP)
     - At the commercial metering unit located prior to injection into Gazprom UGSS
       - Continuous measurement of volume of dry gas sold to Gazprom (at CMU-40)
     - Volume and composition of gas used for own consumption (fuel and start gas, gas to flare ignition, purge gas) at GMU-4;
     - Volume of flared gas in HP flare header (GMU-7);
     - Volume of flared gas in LP flare header (GMU-7).

  b) Ensure that stationary (back-up) data as defined for the JI monitoring system in Section E is measured, transferred (in real time) and stored in an appropriate format in the general database. This includes:
     - Continuous measurements at BCS Komsomolskoye:
       - Volume and composition of dry gas at GMU-6
     - Continuous measurements at CMU-40:
       - Composition of dry gas sold to Gazprom (at CMU-40)

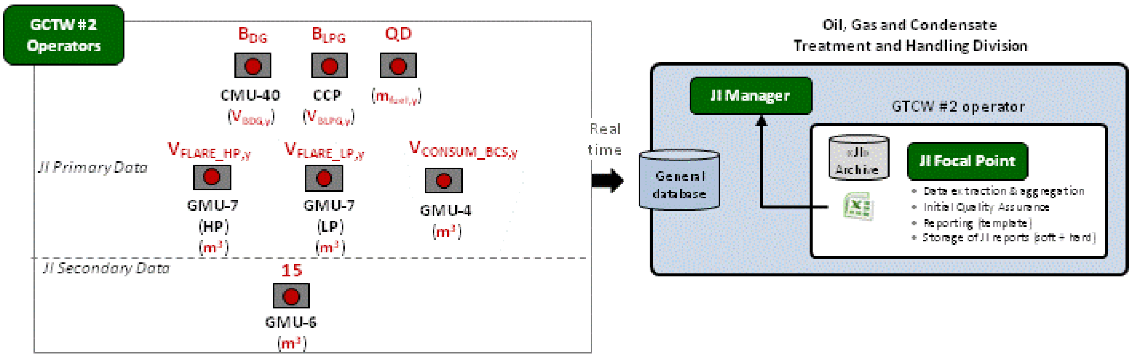
  c) Collect samples for the following fluid streams as per description in Section D.3 used as primary data for monitoring:
     - APG stream from PWRU at the inlet to the BCS (sampling at GMU-1)
     - Dry gas stream prior to injection to Gazprom UGSS (sampling at CMU-40)
     - LPG stream prior to delivery to PWRU at the CCP (sampling at CCP)

- BCS JI Focal Point has the following responsibilities:

  a) Ensure that all GTCW #2 operators involved in JI monitoring activities has the appropriate competence and receives training required to perform their duties as described in the MM;
  b) On a daily basis, ensure that the aggregate volumetric flows of gas and LPG over the past 24-hour period through the relevant measurement points are calculated and consolidated based on the records in the general database and entered into the Excel template developed for reporting of relevant primary and secondary data as per procedure described in Sections D.2 and E.2 of the MM;

c) On a monthly basis, undertake an initial quality assurance of the data entered into the Excel template as described in Sections D.7 and E.3 of the MM to identify and avoid errors and omissions in data prior to reporting;
d) Following initial QA, submit the completed Excel template containing data for one (1) month as described in Sections D.8 and E.4 of the MM to the JI Manager of the Oil, Gas and Condensate Treatment and Handling Division by no later than the 2nd day of the following month;
e) Establish and maintain an archive for storage of Excel templates as described in Sections D.9 and E.5 of the MM, containing reported, aggregated data for JI parameters (both primary and stationary) in both soft and hard copies. All records should be properly archived until at least two years after the end of the JI crediting period (till the beginning of 2015).

Figure 6: Key functions and responsibilities for the Gas and Condensate Treatment Department



The Production Chemical Analysis Laboratory:

The key functions and responsibilities of staff at the Production Chemical Analysis Laboratory (responsible – Ms. Zholudeva M., Chief of the Oil Quality Control Unit) are:

➢ *Laboratory staff:*

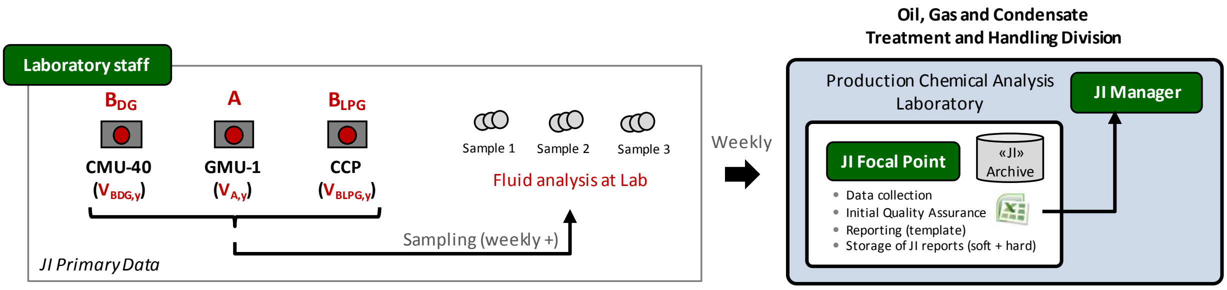
a) Analyse the samples at the laboratory according to the procedure described in Section D.3 of the MM and properly store the results of the analysis as required for JI monitoring in hard and soft copies on-site as per description in Section D.9 of the MM;
b) Ensure that the "Laboratory - JI Focal Point" has access to/receives all relevant information required to complete the JI Excel template for reporting of fluid compositions in a timely manner.

➢ Laboratory JI Focal Point has the following responsibilities:

a) Prior to commissioning of the JI project, finalize a written procedure describing (1) the organization of the collection of periodic samples of the relevant fluid streams (including detailed description of the location of sampling probes, standards and equipment applied for sampling, etc.), (2) how these will be analysed at the Laboratory (including a description of the equipment to be used, its calibration requirements, the standards applied in compositional analysis and calculation of fluid properties, the accreditation status of the laboratory, etc.) and (3) competence requirements for staff involved in sampling, analysis and reporting of results to the Laboratory -JI Focal Point;
b) Ensure that Laboratory staff involved in JI monitoring activities has the appropriate competence and receives training required to perform their duties as described in the MM;
c) At the end of each month, enter the required information for each compositional sample collected and analysed during the past month into the Excel template developed for reporting of these data;

d) Undertake an initial quality assurance of the data entered into the Excel template as described in Section D.7 of the MM to identify and avoid errors and omissions in the primary data set prior to reporting;
e) If the primary data set compiled based on Laboratory results is incomplete and fails to comply with the sampling and analysis frequency required for JI monitoring due to erroneous or missing data entries (monthly), request standby (back-up) data describing the compositional breakdown of the relevant gas stream(s) from the BCS - JI Focal Point and replace missing data if possible as described in Section G of the MM;
f) Following initial QA and replacement of erroneous or missing data (if necessary), submit the completed Excel template containing data for one (1) month to the JI Manager of the Oil, Gas and Condensate Treatment and Handling Division by no later than the 2nd day of the following month as described in Section D.8 of the MM.

Figure 7: Key functions and responsibilities for the Production Chemical Analysis Laboratory



Chief Metrology Department:

The key functions and responsibilities of staff at the Chief Metrology Department are:

➢ *Service Entity, working under contract with RN-Purneftegaz*

a) Ensure that all monitoring equipment items installed for measurement of parameters described in Section D and E of the MM complies with the relevant requirements, including any national or international standards referred to for individual measurements (any meters installed shall meet the Russian operational procedures in respect of the oil and gas sector). All the equipment within the BCS site shall be brand new, with a service life of at least 20 years;
b) Ensure that an archive describing the key characteristics of all meters utilized for JI measurements, including necessary information on all related sub-devices, is updated on a continuous basis;
c) Ensure that calibration and maintenance is carried out in accordance with manufacturers' rules and national regulations, with a periodicity of at least once per year or less as necessary (depending on the situation). This includes control of meter accuracy levels and software configurations related to the gas flow measurements. All calibration records shall be properly archived and be made accessible for periodic verification by the selected AIE if necessary;
d) Maintain a device failure register for each meter to register any deviations from their standard operational mode;
e) On a continuous basis, transfer any data on device failures to *Instrumentation JI Manager* and ensure that defect/dysfunctional devices required for JI monitoring are repaired/replaced and calibrated in a timely manner.

➢ Instrumentation JI Manager – Mr. M. Strugatskiy, Chief Metrologist has the following responsibilities:

a) Prior to commissioning of the JI project, complete an overview of all measurement devices installed that will be utilized as part of the JI monitoring in the Excel template developed for reporting of these data and submit this to the JI Project Coordinator;
b) On an continuous basis, receive any data on device failures from the Service Entity and provide control that defect/dysfunctional devices required for JI monitoring are repaired/replaced and calibrated in a timely manner;
c) At the end of each month, complete an updated version of the *Instrumentation Excel template* containing (**1**) an overview of the status of metering equipment installed, (**2**) their calibration status, and (**3**) metering stream logbooks for each meter used for JI monitoring describing all major events as described in Section F.1 and submit this through the Division Manager (for approval) to the JI Project Coordinator by the 5th day of the following month as described in Section D.8 of the MM.

Power Supply Division:

The key functions and responsibilities of staff at the Power Supply Division are:

➢ *Service Entities, working under contract with RN-Purneftegaz*

a) Ensure that technical electricity metering is arranged for by installation and calibration of electricity meters in accordance with manufacturers' rules and national regulations such that the total amount of electricity imported from the Tyumen regional grid for operation of facilities utilized as part of the JI project activity can be calculated and reported as per the relevant JI procedures;
b) Maintain a device failure register for each meter to register any deviations from their standard operational mode;
c) On an continuous basis, transfer any data on device failures to Power JI Manager and ensure that defect/dysfunctional devices required for JI monitoring are repaired/replaced and calibrated in a timely manner;
d) Measurement of diesel consumption for operation of Diesel Power Plants (DPP-1, 2).

➢ Power JI Manager – Mr. Bekirov, A.M., Manager of the Power supply division:

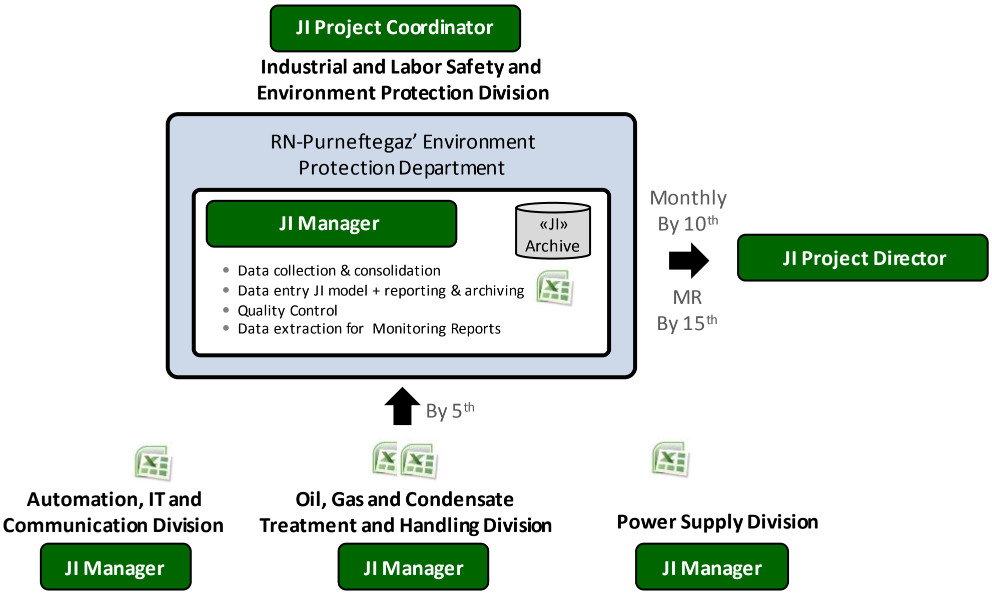
a) On an continuous basis, transfer any data on device failures to the JI Project Coordinator and ensure that defect/dysfunctional devices required for JI monitoring are repaired/replaced and calibrated in a timely manner;
b) At the end of each month, complete the Power Excel template developed for reporting of the total electricity consumption for the last month measured by individual electricity meters and submit this through the Division Manager (for approval) to the JI Project Coordinator by the 5th day of the following month as described in Section D.8 of the MM;
c) On a continuous basis, receive any data on device failures from the Service Entity and provide control that defect/dysfunctional devices required for JI monitoring are repaired/replaced and calibrated in a timely manner.

Environment Protection Department:

The Environmental Protection Department (Industrial and Labour Safety and Environment Protection Division) shall coordinate the interaction among all divisions in charge of collecting and transferring primary and standby (back-up) data as required for JI monitoring, manage the consolidation of data records from the various divisions and the periodic calculation of net emission reductions achieved and coordinate training of relevant staff. Mr. O. Nushayev, Deputy Chief Engineer, Head of Industrial and Labour Safety and Environment Protection Division was appointed as a JI Project Coordinator to manage these responsibilities prior to the start of the crediting period.

a) Manage and organize the periodic onsite verification of emission reductions, including on-site audits;
b) Upon receipt of monthly data from the division JI managers (by the 5th day of the following month), enter all primary and standby (back-up) data sets as reported in the Excel templates into the JI Monitoring Model;
c) Review of data entered into the JI Monitoring Model to prevent and identify errors and omissions during data collection and/or manual transfers of records;
d) Establish and maintain an electronic archive to store a copy of the JI Monitoring Model after entry and quality control of data for each month;
e) By the 10th of each month, summarize the results of the JI project activity for the previous month in a short memo to the JI Project Director;
f) By the 15th day following the end of each monitoring period, (**1**) determine the relevant parameter values for all JI parameters to be applied for calculations and finalize the calculation of the net emission reductions achieved as described in Section L.2, (**2**) extract the necessary data from the JI Monitoring Model into an Excel sheet (.xls) that will be submitted as an appendix to the periodic Monitoring Report as described in Section L.3, and (**3**) store a copy of the final data set in the electronic archive as described in Section L.3 of the MM.

Figure 9: Key functions and responsibilities for the JI Project Coordinator



The Monitoring report describing the outcomes of the JI Monitoring Model and other relevant information is prepared for a specified period of monitoring (e.g., quarterly/annually) by the JI Manager – Ms. Korobova T., Acting Head of the Environment Protection Unit - using the format of Monitoring report attached to the Monitoring Manual. The draft report is submitted by JI Manager to the JI Project Coordinator of the EPD responsible for review and cross-checking. The final draft is submitted to JI Project Director for approval.

The JI Project Director submits the report to the WB for review and is responsible for the conduct of the verification.

JI Project Director – Rostislav Latysh, Director of Department for Economy and Business Planning, NK Rosneft has the following responsibilities:

a) manage JI project implementation and fulfilment of contractual obligations according to ERPA, which includes the following activities vis à vis the World Bank:
   i. submit on a regular basis Monitoring Reports for review and approval by the World Bank

ii. facilitate communication related to issues raised during Verification between AIE, the World Bank and relevant units and staff of RN-Purneftegaz;

b) manage verification and issuance of ERUs;

c) Coordinate communication with all stakeholders to the JI project activity, both internal and external.

SECTION D. Data and parameters

D.1. Data and parameters determined at registration and not monitored during the monitoring period, including default values and factors

Data / Parameter:	GWP_{CH4}
Data unit:	-- (dimensionless)
Description:	Approved Global Warming Potential for methane
Source of data used:	IPCC, Third Assessment Report, 2001
Value(s) :	21
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project Emission calculations
Additional comment:	

Data / Parameter:	π
Data unit:	-- (dimensionless)
Description:	The ratio of the circumference of a circle to its diameter
Source of data used:	On-Line Encyclopedia of Integer Sequences (OEIS)
Value(s) :	3.1416
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project Emission calculations (accidental leaks)
Additional comment:	

Data / Parameter:	P_S
Data unit:	kPa
Description:	Standard pressure
Source of data used:	PDD / AM0009 v2.1
Value(s) :	101.325 kPa
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project Emission calculations (accidental leaks)
Additional comment:	Standard pressure.

Data / Parameter:	T_S
Data unit:	^{0} Celsius
Description:	Standard temperature
Source of data used:	-
Value(s) :	20 ^{0}C
Indicate what the data are used for (Baseline/ Project/ Leakage emission	Baseline and Project Emission calculations

calculations)	
Additional comment:	Standard temperature.

Data / Parameter:	L_1
Data unit:	Meter
Description:	Length of pipeline from PWRU to BCS Komsomolskaya
Source of data used:	To be completed
Value(s) :	357 meters
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project Emission calculations (accidental leaks)
Additional comment:	

Data / Parameter:	L_2
Data unit:	Meters
Description:	Length of pipeline from BCS Komsomolskaya to UGSS
Source of data used:	PDD
Value(s) :	5,434 meters
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project Emission calculations (accidental leaks)
Additional comment:	

Data / Parameter:	d_1
Data unit:	Meter
Description:	Diameter of pipeline from PWRU to BCS
Source of data used:	PDD
Value(s) :	1.22 meters
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project Emission calculations (accidental leaks)
Additional comment:	

Data / Parameter:	d_2
Data unit:	Meter
Description:	Diameter of pipeline from BCS to UGSS
Source of data used:	PDD
Value(s) :	0.53 meters
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project Emission calculations (accidental leaks)
Additional comment:	

Data / Parameter:	$V_{GGPP,y}$
Data unit:	Thousand Nm^3
Description:	Volume of gas provided to the Gubkinskiy GPP in baseline
Source of data used:	PDD, converted to daily volume
Value(s) :	950 Million Nm^3/year / 365 days * 91 days in the monitoring period =

	236,849.315 thousand Nm^3
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline Emission calculations
Additional comment:	

Data / Parameter:	$V_{BCSb,y}$
Data unit:	Thousand Nm^3
Description:	Volume of gas used to operate the BCS in the baseline
Source of data used:	PDD, converted to daily volume
Value(s) :	9 Million Nm^3/year / 365 days * 91 days in the monitoring period = 2,243.836 thousand Nm^3
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline Emission calculations
Additional comment:	

Data / Parameter:	$EF_{grid,y}$
Data unit:	tCO_2/MWh
Description:	Emission factor of Tyumen regional grid during period y
Source of data used:	PDD
Value(s):	1.3 (tCO_2/MWh)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project Emission calculations
Additional comment:	

Data / Parameter:	TDL_y
Data unit:	--
Description:	Average technical transmission and distribution losses in grid
Source of data used:	PDD
Value(s) :	20.0 %
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project Emission calculations
Additional comment:	

Data / Parameter:	$EF_{pipeline}$
Data unit:	$kgCH_4$/hour
Description:	Total Emission Factor for gas transport pipelines
Source of data used:	PDD
Value(s) :	0.664 (kg/hour)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project Emission calculations
Additional comment:	

Data / Parameter:	$EF_{equipment}$
Data unit:	$kgCH_4$/hour
Description:	Total Emission Factor for all equipment
Source of data used:	PDD
Value(s) :	8.725 (kg/hour)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project Emission calculations
Additional comment:	

D.2. Data and parameters monitored

Data / Parameter:	**V** A,y
Data unit:	Thousand Nm^3
Description:	Volume of APG produced at the PWRU, recovered and transferred to the BCS at point A (Stream #1)
Measured /Calculated /Default:	Calculated
Source of data:	Formula 16
Value(s) of monitored parameter:	406,990.653
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	For calculation of baseline emissions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	-
Measuring/ Reading/ Recording frequency:	-
Calculation method (if applicable):	Formulae 16 (in Section B.2)
QA/QC procedures applied:	1. Control of variances in calculated values beyond those expected as normal variances (to avoid substantial non-conformities and deviations)

Data / Parameter:	**V** BDG,y
Data unit:	Thousand Nm^3
Description:	Volume of dry gas (DGS) produced at the BCS and transferred to Gazprom UGSS at point B_{DG} (Stream #2)
Measured /Calculated /Default:	Measured
Source of data:	CMU-40
Value(s) of monitored parameter:	359,791.936
Indicate what the data are used for (Baseline/ Project/ Leakage emission	For calculation of project emissions

<table>
<tr><td>calculations)</td><td></td></tr>
<tr><td>Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)</td><td>
#1 (working meter)

Ultrasonic flow meter for dry gas
<table>
<tr><td>Module type:</td><td>SGU Flowsic 600/16CL600P4</td></tr>
<tr><td>Serial number:</td><td>10318655</td></tr>
<tr><td>Line size:</td><td>400 mm</td></tr>
<tr><td>Transducers:</td><td>Flowsic 600/16CL600P4</td></tr>
<tr><td>Flow computer:</td><td>Controller FloBoss S600</td></tr>
<tr><td>Max flow rate:</td><td>6000 m^3/h</td></tr>
<tr><td>Calibration freq.:</td><td>Once per 4 years</td></tr>
<tr><td>Last calibrated:</td><td>07.10.2010</td></tr>
<tr><td>Accuracy class:</td><td>± 0.3%</td></tr>
</table>

Temperature transmitter
<table>
<tr><td>Module type:</td><td>TSPU «Metran» 276 МП-05</td></tr>
<tr><td>Serial number:</td><td>789931</td></tr>
<tr><td>Range of measurement:</td><td>(0...+50) °C</td></tr>
<tr><td>Calibration freq.:</td><td>Once per 1 year</td></tr>
<tr><td>Last calibrated:</td><td>01.08.2011</td></tr>
<tr><td>Accuracy class:</td><td>± 0.2 °C</td></tr>
</table>

Pressure transmitter
<table>
<tr><td>Module type:</td><td>EJX 510 A</td></tr>
<tr><td>Serial number:</td><td>91K819467</td></tr>
<tr><td>Range of measurement:</td><td>(0…10) MPa</td></tr>
<tr><td>Calibration freq.:</td><td>Once per 5 years</td></tr>
<tr><td>Last calibrated:</td><td>01.08.2011</td></tr>
<tr><td>Accuracy class:</td><td>± 0.1 %</td></tr>
</table>

#2 (back-up meter)

Ultrasonic flow meter for dry gas
<table>
<tr><td>Module type:</td><td>SGU Flowsic 600/16CL600P4</td></tr>
<tr><td>Serial number:</td><td>10318657</td></tr>
<tr><td>Line size:</td><td>400 mm</td></tr>
<tr><td>Transducers:</td><td>Flowsic 600/16CL600P4</td></tr>
<tr><td>Flow computer:</td><td>FloBoss S600</td></tr>
<tr><td>Max flow rate:</td><td>6000 m^3/h</td></tr>
<tr><td>Calibration freq.:</td><td>Once per 4 years</td></tr>
<tr><td>Last calibrated:</td><td>07.10.2010</td></tr>
<tr><td>Accuracy class:</td><td>± 0.3%</td></tr>
</table>

Temperature transmitter
<table>
<tr><td>Module type:</td><td>TSPU «Metran» 276 МП-05</td></tr>
<tr><td>Serial number:</td><td>789930</td></tr>
<tr><td>Range of measurement:</td><td>(0...+50) °C</td></tr>
<tr><td>Calibration freq.:</td><td>Once per 1 year</td></tr>
<tr><td>Last calibrated:</td><td>08.01.2011</td></tr>
<tr><td>Accuracy class:</td><td>± 0.2 °C</td></tr>
</table>

Pressure transmitter
<table>
<tr><td>Module type:</td><td>EJX 510 A</td></tr>
<tr><td>Serial number:</td><td>91K819466</td></tr>
<tr><td>Range of measurement:</td><td>(0…10) MPa</td></tr>
</table>
</td></tr>
</table>

	Calibration freq.: Once per 5 years Last calibrated: 01.08.2011 Accuracy class: ± 0.1 %
Measuring/ Reading/ Recording frequency:	Continuously Continuously/ Continuously
Calculation method (if applicable):	-
QA/QC procedures applied:	1. Control of completeness of data reporting vis-à-vis any reported operational disturbances and availability of monitoring equipment (no deviations from the standard operational mode accepted) 2. Control of variances in records beyond those expected as normal variances (to avoid substantial non-conformities and deviations) 3. Cross-checking using results of cross-checking meter and technological measurements at GMU-6

Data / Parameter:	$\mathbf{V}_{BLPG,y}$
Data unit:	Tons
Description:	Amount of LPG (NGLs) produced at the BCS and transferred to the PWRU's oil treatment unit at point B_{LPG} (Stream #3)
Measured /Calculated /Default:	Measured (level of liquid) and calculated in tons
Source of data:	CPP
Value(s) of monitored parameter:	9,544
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline and project emission calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	**Guided microwave level sensor** Tank -1 Module type: KSR GT611 FX61K.DXCGB1HDMAX Serial number: 17711529 Range of measurement: (0...2350) mm Calibration freq.: Once per 2 years Last calibrated: 16.08.2010 Accuracy class: ± 3 mm Tank -2 Module type: KSR GT611 FX61K.DXCGB1HDMAX Serial number: 17711528 Range of measurement: (0...2350) mm Calibration freq.: Once per 2 years Last calibrated: 27.09.2010 Accuracy class: ± 3 mm
Measuring/ Reading/ Recording frequency:	Daily/Daily/Daily
Calculation method (if applicable):	To ensure conservativeness, a discount factor of 5% is applied to ensure uncertainty at 95% of confidence level

QA/QC procedures applied:	1. Control of completeness of data reporting vis-à-vis any reported operational disturbances and availability of monitoring equipment (no deviations from the standard operational mode accepted) 2. Control of variances in records beyond those expected as normal variances (to avoid substantial non-conformities and deviations)

Data / Parameter:	**$W_{A, y}$**
Data unit:	kgC/Nm³
Description:	Average carbon content of the inlet gas stream at point A
Measured /Calculated /Default:	Measured
Source of data:	Production Chemical Analysis Laboratory
Value(s) of monitored parameter:	**Period** / **Average value** 01/12/2011 – 31/12/2011 / 0.5674 01/01/2012 – 31/01/2012 / 0.5682 01/02/2012 – 29/02/2012 / 0.5686
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	**Gas chromatograph** Module type: Chromatek-Kristall 5000 Serial number: 152862 Calibration freq.: Once per 1 year Last calibrated: 29.11.2011
Measuring/ Reading/ Recording frequency:	Weekly / weekly / weekly
Calculation method (if applicable):	-
QA/QC procedures applied:	1. Control of frequency of data reporting vis-à-vis the minimum frequency required by the PDD (monthly) 2. Control of completeness of data records 3. Control of variances in records for the same stream beyond those expected as normal variances (to avoid substantial non-conformities and deviations) 4. Spot-checks with compositional data from the inline GCs used for flow measurements (when/if considered necessary based on the outcome of the above).

Data / Parameter:	**$W_{BDG, y}$**
Data unit:	kgC/Nm³
Description:	Average carbon content of dry gas sold to Gazprom UGSS at point B_{DG}
Measured /Calculated /Default:	Measured
Source of data:	Production Chemical Analysis Laboratory
Value(s) of monitored parameter:	Period / Average value

	01/12/2011 – 31/12/2011	0.5496
	01/01/2012 – 31/01/2012	0.5483
	01/02/2012 – 29/02/2012	0.5484

Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	**Gas chromatograph** Module type: Chromatek-Cristall 5000 Serial number: 152862 Calibration freq.: Once per 1 year Last calibrated: 29.11.2011
Measuring/ Reading/ Recording frequency:	Weekly / weekly / weekly
Calculation method (if applicable):	-
QA/QC procedures applied:	1. Control of completeness of data records 2. Spot-checks with compositional data from the inline GCs used for flow measurements (when/if considered necessary based on the outcome of the above).

Data / Parameter:	**$\rho_{A,y}$**
Data unit:	kg/Nm³
Description:	Average density of the inlet gas stream at point A
Measured /Calculated /Default:	Calculated based on the results of the composition analysis from gas chromatograph
Source of data:	Production Chemical Analysis Laboratory
Value(s) of monitored parameter:	see table below
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline and project emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	**Gas chromatograph** Module type: Chromatek-Cristall 5000 Serial number: 152862 Calibration freq.: Once per 1 year Last calibrated: 29.11.2011
Measuring/ Reading/ Recording frequency:	Weekly / weekly / weekly
Calculation method (if applicable):	-

Value(s) of monitored parameter:

Period	**Average value**
01/12/2011 – 31/12/2011	0.764
01/01/2012 – 31/01/2012	0.765
01/02/2012 – 29/02/2012	0.765

QA/QC procedures applied:	1. Control of frequency of data reporting vis-à-vis the minimum frequency required by the PDD (monthly) 2. Control of completeness of data records

Data / Parameter:	$\rho_{BDG, y}$
Data unit:	kg/Nm^3
Description:	Average density of dry gas produced at the BCS and transferred to Gazprom UGSS at point B_{DG}
Measured /Calculated /Default:	Calculated based on the results of the composition analysis from gas chromatograph
Source of data:	Production Chemical Analysis Laboratory
Value(s) of monitored parameter:	**Period** / **Average value**: 01/12/2011 – 31/12/2011: 0.743 01/01/2012 – 31/01/2012: 0.741 01/02/2012 – 29/02/2012: 0.741
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	**Gas chromatograph** Module type: Chomatek-Christall 5000 Serial number: 152862 Calibration freq.: Once per 1 year Last calibrated: 29.11.2011
Measuring/ Reading/ Recording frequency:	Weekly / weekly / weekly
Calculation method (if applicable):	-
QA/QC procedures applied:	1. Control of frequency of data reporting vis-à-vis the minimum frequency required by the PDD (monthly) 2. Control of completeness of data records

Data / Parameter:	$V_{FLARE, HP,y}$
Data unit:	Thousand Nm^3
Description:	Volume of gas flared at the high pressure flare (Stream #13)
Measured /Calculated /Default:	Measured
Source of data:	GMU-7
Value(s) of monitored parameter:	272.306
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline (formula 16) and project (formula 17) emission calculations
Monitoring equipment (type, accuracy class, serial	**Mass flow meter** Module type: Mass flowmeter T-mass 65I

number, calibration frequency, date of last calibration, validity)	Serial number: D40DD902000 Line size: 1000 mm Flow computer: UVP-280 Max flow rate: 72000 kg/hour Calibration freq.: Once per 2 years Last calibrated: 12.05.2010 Accuracy class: ± 1.0% **Pressure transmitter** Module type: JUMO Serial number: 145063601010240002 Range of measurement: (0…1) MPa Calibration freq.: Once per 2 years Last calibrated: 18.05.2011 Accuracy class: ± 0.1 % The temperature transmitter is incorporated in the pressure transmitter
Measuring/ Reading/ Recording frequency:	Continuously/ Continuously/ Daily
Calculation method (if applicable):	-
QA/QC procedures applied:	-

Data / Parameter:	$\mathbf{V_{FLARE, LP,y}}$
Data unit:	Thousand Nm^3
Description:	Volume of gas flared at the low pressure flare (Stream #14)
Measured /Calculated /Default:	Measured
Source of data:	GMU-7
Value(s) of monitored parameter:	656.839
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline (formula 16) and project (formula 17) emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	**Mass flow meter** Module type: Mass flowmeter T-mass 65I Serial number: D40DA02000 Line size: 1000 mm Flow computer: UVP-280 Max flow rate: 72000 kg/hour Calibration freq.: Once per 2 years Last calibrated: 12.05.2010 Accuracy class: ± 1.0% **Pressure transmitter** Module type: JUMO Serial number: 145063601010240001 Range of measurement: (0…1) MPa Calibration freq.: Once per 2 years Last calibrated: 18.05.2011 Accuracy class: ± 0.1 %

	The temperature transmitter is incorporated in the pressure transmitter
Measuring/ Reading/ Recording frequency:	Continuously/ Continuously/ Daily
Calculation method (if applicable):	-
QA/QC procedures applied:	-

Data / Parameter:	$\mathbf{V_{CONSUM\_BCS,\ y}}$
Data unit:	Thousand Nm^3
Description:	Volume of dry gas consumption for internal needs (fuel and start gas for turbine drives of compressor units, gas for flare ignition and purge gas) (Stream #10)
Measured /Calculated /Default:	Measured
Source of data:	GMU-4
Value(s) of monitored parameter:	46,616.772
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline (formula 16) and project (formula 17) emissions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	**Ultrasonic flow meter** Module type: SGU Flowsic 600 Serial number: 10188534 Line size: 100 mm Transducer: Flowsic 600 Flow computer: UVP-280 Max flow rate: 1600 ^{3}/hour Calibration freq.: Once per 4 years Last calibrated: 08.07.2010 Accuracy class: ± 0.3% **Temperature transmitter** Module type: TSPU «Metran» 256-04 Serial number: 744002 Range of measurement: (-50...+200) °C Calibration freq.: Once per 1 year Last calibrated: 23.11.2011 Accuracy class: B **Pressure transmitter** Module type: JUMO Serial number: 014229350101011002 Range of measurement: (0…6.3) MPa Calibration freq.: Once per 1 year Last calibrated: 16.06.2011 Accuracy class: ± 0 1 %
Measuring/ Reading/ Recording frequency:	Continuously/ Continuously/ Daily
Calculation method (if applicable):	-

QA/QC procedures applied:	-

Data / Parameter:	**$EC_{PJ,y}$**
Data unit:	MW*hour
Description:	Total consumption of electricity imported from the Tyumen regional grid (Stream #5)
Measured /Calculated /Default:	Measured
Source of data:	
Value(s) of monitored parameter:	2,669.440
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	**Power meter #1** Module type: SET-Zar-01-22-08 Serial number: 308949 Range of measurement: on U 0,85-1,1Uн, on I 1,0-7.5A Calibration freq.: Once per 16 years Last calibrated: 1-st quarter of 2010 Accuracy class: 0.5S **Current transformers** Module type: TLO-10 1-0,5/10R-10/15-300/5 UZ Serial number: №893,904 Range of measurement: 300/5A Calibration freq.: Once per 5 years Last calibrated: 1-st quarter of 2010 Accuracy class: 0.5 **Voltage transformer** Module type: NAMIT-10 – 2UHL2 Serial number: 0079100000002 Range of measurement: 6000/100B Calibration freq.: Once per 8 years Last calibrated: 2-st quarter of 2010 Accuracy class: 0.2/0.5/1/3 **Power meter #2** Module type: SET-Zar-01-22-08 Serial number: 302289 Range of measurement: on U 0,85-1,1Uн, on I 1,0-7.5A Calibration freq.: Once per 16 years Last calibrated: 1-st quarter of 2010 Accuracy class: 0.5S **Current transformers** Module type: TLO-10 1-0,5/10R-10/15-300/5 UZ Serial numbers: №907, №901 Range of measurement: 300/5A Calibration freq.: Once per 5 years Last calibrated: 1-st quarter of 2010 .

Accuracy class:	0,5

Voltage transformer	
Module type:	NAMIT-10 – 2 UHL2
Serial number:	0079100000005
Range of measurement:	6000/100B
Calibration freq.:	Once per 8 years
Last calibrated:	2-st quarter of 2010
Accuracy class:	0,2/0,5/1/3

Power meter #3

Module type:	SET-Zar-01-22-08
Serial number:	309014
Range of measurement:	on U 0,85-1,1Uн, on I 1,0-7.5A
Calibration freq.:	Once per 16 years
Last calibrated:	1-st quarter of 2010
Accuracy class:	0.5S

Current transformers	
Module type:	TLO-10 1-0,5/10R-10/15-150/5 UZ
Serial numbers:	№869, №871
Range of measurement:	150/5A
Calibration freq.:	Once per 5 years
Last calibrated:	1-st quarter of 2010
Accuracy class:	0,5

Voltage transformer	
Module type:	NAMIT-10 – 2 UHL2
Serial number:	0079100000002
Range of measurement:	6000/100B
Calibration freq.:	Once per 8 years
Last calibrated:	2-st quarter of 2010
Accuracy class:	0,2/0,5/1/3

Power meter #4

Module type:	SET-Zar-01-22-08
Serial number:	303855
Range of measurement:	on U 0,85-1,1Uн, on I 1,0-7.5A
Calibration freq.:	Once per 16 years
Last calibrated:	1-st quarter of 2010
Accuracy class:	0.5S

Current transformers	
Module type:	TLO-10 1-0,5/10R-10/15-150/5 UZ
Serial numbers:	№868, №870
Range of measurement:	150/5A
Calibration freq.:	Once per 5 years
Last calibrated:	1-st quarter of 2010.
Accuracy class:	0,5

Voltage transformer	
Module type:	NAMIT-10 – 2 UHL2
Serial number:	0079100000005
Range of measurement:	6000/100B

	Calibration freq.: Once per 8 years Last calibrated: 2-st quarter of 2010. Accuracy class: 0,2/0,5/1/3 **Power meter #5** Module type: SET-4TM.02M.11 Serial number: 0802110825 Range of measurement: on U 0,85-1,1Uн, on I 1,0-7.5A Calibration freq.: Once per 6 years Last calibrated: 1-st quarter of 2011 Accuracy class: 0.5S **Currant transformers** Module type: T-0,66 M UZ Serial numbers: №674646, №674647, №674649 Range of measurement: 200/5A Calibration freq.: Once per 4 years Last calibrated: 1-st quarter of 2010. Accuracy class: 0,5 **Power meter #6** Module type: SET-4TM.02M.11 Serial number: 0802113119 Range of measurement: on U 0,85-1,1Uн, on I 1,0-7.5A Calibration freq.: Once per 6 years Last calibrated: 1-st quarter of 2011 Accuracy class: 0.5S **Currant transformers** Module type: T-0,66 M UZ Serial numbers: №674650, №674652, №674653 Range of measurement: 200/5A Calibration freq.: Once per 4 years Last calibrated: 1-st quarter of 2010. Accuracy class: 0,5
Measuring/ Reading/ Recording frequency:	Continuously / monthly / monthly
Calculation method (if applicable):	-
QA/QC procedures applied:	Control of completeness of data reporting

Data / Parameter:	$\mathbf{m_{diesel}}$
Data unit:	Kg
Description:	Diesel fuel consumption for operation of back-up generator(s)
Measured /Calculated /Default:	Measured
Source of data:	Operational records
Value(s) of monitored parameter:	323.46
Indicate what the data are	Project emission calculations

used for (Baseline/ Project/ Leakage emission calculations)	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Calculation method
Measuring/ Reading/ Recording frequency:	Monthly / monthly / monthly
Calculation method (if applicable):	
QA/QC procedures applied:	-

Data / Parameter:	NCV_{diesel}
Data unit:	KJ/kg
Description:	Net Calorific Value (NCV) of diesel consumed as a result of the project activity
Measured /Calculated /Default:	Default value applied
Source of data:	NCV of gas/diesel oil at the upper limit of the 95% confidence interval from Table 1.2 in Volume 2 of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. This is a conservative approach
Value(s) of monitored parameter:	43,300 (Original reference: 43.3 TJ/Gg[3])
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project Emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A
Measuring/ Reading/ Recording frequency:	Default value taken from the identified source at the end of the monitoring period
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	The appropriateness of the identified default value checked at the end of each monitoring period

Data / Parameter:	$EF_{CO2,diesel}$
Data unit:	kg CO_2/KJ
Description:	CO_2 emission factor for diesel, defined on a per energy unit basis
Measured /Calculated /Default:	Default value
Source of data:	CO_2 emission factor for combustion of gas/diesel oil at the upper limit of the 95% confidence interval from Table 1.2 in Volume 2 of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. This is a conservative approach
Value(s) of monitored	0.0000748 kgCO_2/KJ

[3] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf pg. 1.18

parameter:	(Original reference: 74,800 $kgCO_2/TJ$[4])
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project Emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A
Measuring/ Reading/ Recording frequency:	Default value taken from the identified source at the end of the monitoring period
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	The appropriateness of the identified default value checked at the end of each monitoring period

SECTION E. Emission reductions calculation

E.1. Baseline emissions calculation

The final baseline emissions shall be calculated on the basis of the following gas volumes:

Volume of APG produced as a result of oil production recovered at point A

- (minus) the "theoretical" volume of gas that would have been supplied to the Gubkinsky GPP under the baseline[5], and

- (minus) the "theoretical" volume of gas that would be consumed to operate a BCS_b of a lower capacity.

(14) $$BL_y = BL_{g,y} - BL_{GPPP,y} - BL_{BCSb,y}$$

Where:

BL_y	Final baseline emissions during the period y (tons of CO_2 eq.)
$BL_{g,y}$	Total baseline emissions during the period y (tons of CO_2 eq.)
$BL_{GGPP,y}$	Baseline emissions corresponding to volumes of gas supplied to the Gubkinsky GPP under the baseline during the period y (tons of CO_2 eq.)
$BL_{BCSb,y}$	Baseline emissions due to gas consumption by the BCS_b during the period y

The total baseline emissions during the period y are determined as:

(11) $$BL_{g,y} = V_{A,y} \cdot w_{A,y} \cdot \frac{44}{12} \cdot \frac{1}{1000}$$

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[4] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf pg. 1.23

[5] Whereas the needs of the Gubkinsky GPP are fixed and limited by its operation at the limit of the plant capacity, the maximum value during the last three years (equal to 950 Million m^3/y) was used for calculating the above volume on a conservative basis (ref. Appendix 2 to the PDD).

Where:

$BL_{g,y}$	Total baseline emissions during the period y (tons of CO_2 eq.)
$V_{A,y}$	Volume of gas produced at the oil field during the period y (Nm^3)
$w_{A,y}$	Average carbon content in the gas produced at point A during the period y (kgC/Nm^3)

As per revised monitoring plan, the volume of gas produced at the oil field during the period y and supplied to the BSC is calculated as follows:

(16)

$$V_A = \frac{(V_{BDG,y} + V_{CONSUM BCS,y}) * \rho_{BDG,y} + V_{LPG,y} + V_{FLARES,y} * \rho_{A,y}}{\rho_{A,y}},$$

Where

$V_{BDG,y}$	-	Volume of dry gas (DGS) produced at the BCS and transferred to Gazprom UGSS at point B_{DG} (thousand nm^3);
$V_{CONSUM\_BCS,y}$	-	Volume of dry gas consumed for own needs (fuel and start gas for turbine drives of compressor units, gas for ignition and purge gas) measured at point CMU-4 (thousand nm^3);
$\rho_{BDG,y}$	-	Density of dry gas produced at the BCS and transferred to Gazprom UGSS at point B_{DG} (kg/nm^3);
$\rho_{A,y}$	-	Density of APG at point A (kg/nm^3);
$V_{FLARES,y}$	-	Volume of APG flared at high and low pressure flares at the BCS (measured at the point GMU-4, thousand nm^3);
$\rho_{A,y}$	-	Density of APG supplied to the BCS at point A during the period y (kg/nm^3);
$V_{LPG,y}$	-	Amount of LPG produced at the BCS and transferred to the PWRU's oil treatment unit at point B_{LPG} (tons).

The baseline emissions corresponding to the volumes of gas that would have been supplied to the Gubkinsky GPP under the baseline during the period y are determined as:

(12)

$$BL_{GPPPy} = V_{GGPP,y} \cdot w_{carbon,GGPP,y} \cdot \frac{44}{12} \cdot \frac{1}{1000}$$

Where:

$BL_{GGPP,y}$	Baseline emissions corresponding to a "theoretical" volume of gas supplied to the Gubkinsky GPP under the baseline during the period y (tons of CO_2 eq.)
$V_{GGPP,y}$	"Theoretical" volume of gas supplied to the Gubkinsky GPP under the baseline during the period y (Nm^3)
$w_{carbon,GGPP,y}$	Average carbon content in the gas produced at point A during the period y (equal to $w_{A,y}$, kgC/Nm^3)

Baseline emissions due to gas consumption by the BCS_b during the period y are determined as:

(13)

$$BL_{BCSby} = V_{BCSb,y} \cdot w_{carbon,BCSb,y} \cdot \frac{44}{12} \cdot \frac{1}{1000}$$

Where:

$BL_{BCSb,y}$	Baseline emissions due to the gas consumption by the "theoretical" BCS_b
$V_{BCSb,y}$	"Theoretical" volume of gas that would be supplied to the BCS_b with a lower capacity under the baseline during the period y (Nm^3)
$w_{carbon,BCSb,y}$	Average carbon content in the gas produced at point A during the period y (equal to $w_{A,y}$, kgC/Nm^3)

For the monitoring period in consideration, the relevant parameter values and the resulting baseline emissions are:

Parameter	Unit	Value			
		01/12/2011-31/12/2011	**01/01/2012-31/31/2012**	**01/02/2012-29/02/2012**	**Total/** Average
$V_{A,y}$	Thousand Nm^3	135,067.706	138,895.219	133,027.728	**406,990.653**
$w_{A,y}$	kgC/m^3	0.5674	0.5682	0.5686	0.5681
$\rho_{A,y}$	kg/nm^3	0.7629	0.7641	0.7644	0.7638
$V_{GGPP,y}$	Thousand Nm^3	80,684.932	80,684.932	75,479.452	**236,849.315**
$V_{BCSb,y}$	Thousand Nm^3	764.384	764.384	715.068	**2,243.836**
$V_{BDG,y}$	Thousand Nm^3	119,317.900	123,876.580	116,597.456	**359,791.936**
$\rho_{BDG,y}$	kg/nm^3	0.7423	0.7409	0.7411	0.7414
$w_{BDG,y}$	kgC/m^3	0.5496	0.5483	0.5484	0.5488
$V_{LPG,y}$	ton	3,277.0	3,146.6	3,120.4	**9,544.1**
$V_{CONSUM\_BCS,y}$	Thousand Nm^3	15,409.080	14,969.092	16,238.600	**46,616.772**
$V_{FLARES,y}$	Thousand Nm^3	47.354	306.736	575.055	**929.145**
$BL_{g,y}$	tCO_2	281,342.4	289,315.0	277,093.2	**847,750.6**
BL_y	**tCO_2**	111,685.7	119,658.3	118,382.0	**349,726.0**

E.2. Project emissions calculation

Four distinct sources of project emissions shall be calculated according to the formulae presented in the determined PDD:

1. CO_2 emissions from fuel consumption
2. CO_2 emissions due to consumption of other fuels in place of the recovered gas
3. CO_2 emissions from consumption of electricity supplied by the Tyumen regional power grid
4. CH_4 emissions from leakages (during production, handling and treatment of the recovered APG, and from any potential accidents)

CO_2 emissions from fuel consumption

As per revised monitoring plan, the calculation of CO_2 emissions from on-site fuel combustion, leaks, flaring and venting during transport and processing of recovered gas are calculated according to Formula 17.

(17) $$PE_{CO2,gas,y} = V_{CONSUM\_BCS,y} * w_{BDG,y} * 44/12 + V_{FLARES,y} * w_{A,y} * 44/12$$

Where

$V_{CONSUM\_BCS,y}$	-	Volume of dry gas consumed for own needs (fuel and start gas for turbine drives of compressor units, gas for ignition and purge gas) measured at point CMU-4 (thousand nm^3);
$V_{FLARES,y}$	-	Volume of APG flared at high pressure flare ($V_{FLARE,HP,y}$) and low pressure flare ($V_{FLARE,HP,y}$) at the BCS (thousand nm^3);
$w_{BDG,y}$	-	Average carbon content of dry gas measured at point B_{DG} (kgC/nm^3);
$w_{A,y}$	-	Average carbon content of APG supplied to the BCS at point A (thousand nm^3).

For the monitoring period in consideration, the relevant parameter values and the resulting CO_2 emissions from the project activity due to combustion, flaring or venting of recovered gas are:

Parameter	**Unit**	**Value**			
		12/01/2011-31/12/2011	**01/01/2012-31/01/2012**	**02/01/2012-29/02/2012**	**Total**/Average
$V_{CONSUM\_BCS,y}$	Thousand Nm^3	15,409.080	14,969.092	16,238.600	**46,616.772**
$V_{FLARES,y}$	Thousand Nm^3	47.354	306.736	575.055	**929.145**
$w_{A,y}$	$kgC/Nм^3$	0.5674	0.5682	0.5686	0.5681
$w_{BDG,y}$	$kgC/Nм^3$	0.5496	0.5483	0.5484	0.5488
$PE_{CO2,gas,y}$	tCO_2	31.103.5	30.758.5	33.871.8	**95.733.7**

CO_2 emissions due to consumption of other fuels in place of the recovered gas

The new JI facility is primarily been fuelled with the recovered gas treated in the facility (taken out prior to measurement of export volumes), but limited amounts of diesel fuel is used for the operation of back-up diesel generators at the DPP (e.g. during times of shut-down and start-up). This is a minor source of emission. The following formula is used to calculate the resultant CO_2 emissions from diesel consumption (no other fuels have been utilized):

(4) $$PE_{CO2,otherfuels,y} = \frac{1}{1000} \cdot m_{diesel,y} \cdot NCV_{diesel} \cdot EF_{CO2,diesel}$$

Where:

$PE_{CO2,other-fuels,y}$	CO_2 emissions due to consumption of other fuels than the recovered gas due to the project activity during the period y, in tons of CO_2
$m_{diesel,y}$	Quantity of diesel consumed due to the project activity during the period y, in kg
NCV_{diesel}	Net calorific value of diesel, in KJ/kg
$EF_{CO2,diesel}$	CO_2 emission factor of diesel, in kg CO_2/KJ

For the monitoring period in consideration, the relevant parameter values and the resulting CO_2 emissions from consumption of other fuels than the recovered gas due to the project activity are:

Parameter	**Unit**	**Value**			
		12/01/2011-	**01/01/2012-**	**02/01/2012-**	**Total**

		31/12/2011	31/01/2012	29/02/2012	
$m_{diesel,y}$	kg	0	12.91	310.55	323.46
NCV_{fuel}	KJ/kg	43,300	43,300	43,300	-
$EF_{CO2,fuel}$	kg CO_2/KJ	7.48E-05	7.48E-05	7.48E-05	-
$PE_{CO2,other-fuels,y}$	tCO_2	0	0.0418	1.0058	**1.0476**

<u>*CO_2 emissions from consumption of electricity supplied by the Tyumen regional power grid*</u>

The project activity consumes electricity supplied by the Tyumen regional power grid, and relevant emissions associated with this consumption shall be considered as a source of project emissions.

This source of project emissions shall be quantified with reference to elements of the *"Tool to calculate project emissions from electricity consumption"* (version 01/EB32) (Tool) as follows:

(**10**) $$PE_{EC,y} = EG_{PJ,y} \cdot EF_{grid,y} \cdot (1 + TDL_y)$$

Where:

$PE_{EC,y}$	Project emissions from electricity consumption during the period y (in tCO_2)
$EG_{PJ,y}$	Amount of electricity consumed by the project during the period y (in MWh)
$EF_{grid,y}$	(Conservative) default grid emission factor (Tool) (in tCO_2/MWh)
TDL_y	(Conservative) default value for technical losses during transmission and distribution within the power grid (in %)

For the monitoring period in consideration, the relevant parameter values and the resulting CO_2 emissions from consumption of electricity supplied by the Tyumen regional power grid are:

Parameter	Unit	Value			
		12/01/2011-31/12/2011	01/01/2012-31/01/2012	02/01/2012-29/02/2012	Total
$EG_{PJ,y}$	MWh	813,300	754,800	1,101,340	2,669.440
$EF_{grid,y}$	tCO_2/MWh	1.300	1.300	1.300	-
TDL_y	%	20%	20%	20%	-
$PE_{EC,y}$	tCO_2	1,269.0	1,177.5	1,718.1	**4,164.0**

<u>*CH_4 emissions from leakages*</u>

As per the determined PDD, there are three sources of CH_4 emissions which shall be accounted as project emissions:

i. CH_4 emissions from recovery and processing of the gas
ii. CH_4 emissions from transport of the gas in pipelines under the normal operating conditions
iii. CH_4 emissions from transport of the gas in pipelines when accidental event occurred

*(**i**) CH_4 emissions from recovery and processing of the gas*

CH_4 emissions from recovery and processing of the gas are calculated based on Formula 5 in the PDD, simplified by taking a conservative approach:

(5) $$PE_{CH4,plants,y} = GWP_{CH4} \cdot \frac{1}{1000} \cdot w_{CH4,equipment,y} \cdot EF_{equipment} \cdot T_{equipment,plant}$$

Where:

$PE_{CH4,plants,y}$	CH_4 emissions from the project activity at the BCS during the period y, in tCO_{2e}
GWP_{CH4}	The approved Global Warming Potential for methane
$w_{CH4,equipment,y}$	Average methane weight fraction of recovered gas at point B_{DG}, in kg-CH_4/kg
$EF_{equipment}$	Total emission factor of all equipment items based on EPA fugitive emissions data, in kg/hour
$T_{equipment,plant}$	The operating time of the equipment, in hours

For simplicity, it is conservatively assumed that all equipment items have been in full operations 24 hours a day throughout the monitoring period. The total emission factor for *all* equipment items has been calculated by summarizing the products of the emission factor for each type of equipment multiplied with the equipment inventory of each type. The average methane fraction of the leaking gas has been set equal to the average methane weight fraction of recovered gas at point B_{DG} (i.e. the dry gas stream; this is a conservative approach).

For the purpose of calculating the appropriate emission factor in Formula 5, the table extracted from the EPA protocol presented in AM0009 is used (see Table below).

Oil and natural gas production average emission factors

Equipment Type	**Service**	**Emission Factor (EF) (kg/hour/equipment item) for TOC**
Valves	Gas	4.5E-3
Pump seals	Gas	2.4E-3
Others*	Gas	8.8E-3
Connectors	Gas	2.0E-4
Flanges	Gas	3.9E-4
Open-ended lines	Gas	2.0E-3

TOC: Total Organic compound
Source: US EPA-453/R-95-017 Table 2.4, page 2-15
*"Other" equipment type was derived from compressors, diaphragms, drains, dump arms, hatches, instruments, meters, pressure relief valves, polished rods, relief valves and vents. This "other" equipment type should be applied for any equipment type other than connectors, flanges, open-ended lines, pumps or valves.

Applying the inventory of equipment installed for recovery and processing of gas, the emission factor is determined as:

Equipment Type:	**Number:**	**EF per item:**	**EF item group:**
Valves	1	4.5E-3	0.005
Pump seals	0	2.4E-3	0.000
Others*	987	8.8E-3	8.686
Connectors	26	2.0E-4	0.005
Flanges	76	3.9E-4	0.030
Open-ended lines	0	2.0E-3	0.000
$EF_{equipment}$			**8.725**

For the monitoring period in consideration, the relevant parameter values and the CH_4 emissions from recovery and processing of the gas (in tCO_{2e}) are:

Parameter	Unit	Value			
		12/01/2011-31/12/2011	01/01/2012-31/01/2012	02/01/2012-29/02/2012	Total
GWP_{CH4}	$kgCO_{2e}/kgCH_4$	21	21	21	-
$w_{CH4,equipment,y}$	$kgCH_4/kg$	0.8326	0.8340	0.8347	-
$EF_{equipment}$	kg/h	8.725	8.725	8.725	-
$T_{equipment,plant}$	h	744	744	696	2,184
$PE_{CH4,plants,y}$	t CO_{2e}	114	114	106	**334**

***(ii)** CH_4 emissions from transport of the gas in pipelines under the normal operating conditions*

CH_4 emissions from transport of the gas in pipelines under the normal operating condition are calculated based on Formula 6 in the PDD, simplified by taking a conservative approach:

(**6**) $$PE_{CH4,pipeline,y} = GWP_{CH4} \cdot \frac{1}{1000} \cdot w_{CH4,pipeline,y} \cdot EF_{pipeline} \cdot T_{equipment,pipeline}$$

Where:

$PE_{CH4,pipeline,y}$	CH_4 emissions from the project activity due to transportation of gas in pipelines during the period y, in tCO_{2e}
GWP_{CH4}	The approved Global Warming Potential for methane
$w_{CH4,pipeline,y}$	Average methane weight fraction of recovered gas at point B_{DG}, in kg-CH_4/kg
$EF_{pipeline}$	Total emission factor of all equipment items based on EPA fugitive emissions data, in kg/hour
$T_{equipment,pipeline}$	The operating time of the equipment, in hours

For simplicity, it is conservatively assumed that all equipment items have been in full operations 24 hours a day throughout the monitoring period. The total emission factor for *all* equipment items has been calculated by summarizing the products of the emission factor for each type of equipment multiplied with the equipment inventory of each type. The average methane fraction of the leaking gas has been set equal to the average methane weight fraction of recovered gas at point B_{DG} (i.e. the dry gas stream; this is a conservative approach).

For the purpose of calculating the appropriate emission factor in Formula 6, the table extracted from the EPA protocol presented in AM0009 is used. Applying the inventory of equipment installed for transportation of gas in pipelines is determined as:

Equipment Type:	Number:	EF per item:	EF item group:
Valves	67	4.5E-3	0.302
Pump seals	0	2.4E-3	0.000
Others*	20	8.8E-3	0.176
Connectors	0	2.0E-4	0.000
Flanges	478	3.9E-4	0.186
Open-ended lines	0	2.0E-3	0.000
$EF_{equipment}$			**0.664**

For the monitoring period in consideration, the relevant parameter values and the CH_4 emissions from transport of the gas in pipelines under the normal operating conditions (in tCO_{2e}) are:

Parameter	Unit	Value			
		12/01/2011-31/12/2011	01/01/2012-31/01/2012	02/01/2012-29/02/2012	Total
GWP_{CH4}	$kgCO_{2e}/kgCH_4$	21	21	21	-
$w_{CH4,equipment,y}$	$kgCH_4/kg$	0.8326	0.8340	0.8347	-
$EF_{pipeline}$	kg/h	0.664	0.664	0.664	-
$T_{equipment,plant}$	h	744	744	696	**2,184**
$PE_{CH4,pipeline,y}$	tCO_{2e}	8.7	8.7	8.1	**25.4**

***(iii)** CH_4 emissions from transport of gas in pipelines when accidental event occurred*

In case of any accidental gas emissions from the pipeline connecting the Komsomolskoye field and the BCS_P (denominated pipeline 1) or from the pipeline connecting the BCS_P and the Gazprom reception point (denominated pipeline 2), the resultant CH_4 emission shall be estimated and accounted as a source of project emissions (note: the formula presented in the methodology/PDD has been revised as described in paragraph 8 in Section B.2, to provide meaningful results):

(7) $$PE_{CH4,pipeline,accident} = GWP_{CH_4} \cdot \frac{1}{1000} \cdot (V_{A_1,A_2,accident} + V_{remain,accident}) \cdot w_{CH_4,pipeline,accident}$$

With:

(8) $$V_{A1,A2,accident} = (t_2 - t_1) \cdot F$$

(9) $$V_{remain,accident} = d_i \cdot \pi \cdot L_i \cdot \frac{P_P}{P_S} \cdot \frac{T_{S(K)}}{T_{P(K)}}$$

Where:

$PE_{CH4,pipeline,accident}$	CH_4 emissions as a result of an accidental gas emission from pipeline *i* (in tCO_{2e})
$V_{A1,A2,accident}$	Volume of gas supplied to the pipeline *i* from the time the gas leakage started until the shutdown valves were closed (Nm^3)
$V_{remain,accident}$	Volume of gas remaining in the pipeline *i* after the shutdown valves have been closed (Nm^3)
$w_{CH4,pipeline,accident}$	Average CH_4 weight fraction of the gas in pipeline *i* (in $kgCH_4/Nm^3$)
t_1	The time the gas leakage caused by the accident occurred, calculated by means of continuous pipeline pressure monitoring
t_2	The time that the shutdown valves closed both the upstream and downstream pipeline on the basis of operational data
F	The flow rate of gas supplied to pipeline *i*, on the basis of flowmeter readings (in Nm^3/sec)
d_i	Pipeline radius of pipeline *i* (m)
π	The ratio of the circumference of a circle to its diameter
L_i	Pipeline length of pipeline *i* (m)
P_P	The pressure in the pipeline *i* when the shutdown valves close both upstream and downstream of the pipeline (in kPa)
P_S	Standard pressure (in kPa)
$T_{P(K)}$	Pipeline temperature at the moment of isolating a leakage by isolating valves (in Kelvin, converted from ºC for use in gas formula)
$T_{S(K)}$	Standard temperature (in Kelvin, converted from ^{0}C for use in gas formula)

i	Pipeline i, either 1 or 2

The total project emissions are calculated in accordance to the following formula:

(18)

$$PE_{Total,y} = PE_{CO2,gas,y} + PE_{CO2,other-fuels,y} + PE_{EC,y} + PE_{CH4,plants,y} + PE_{CH4,pipeline,y} + PE_{CH4,pipeline,accident,y}$$

Where,

$PE_{CO2,gas,y}$	CO_2 emissions from the project activity due to combustion, flaring or venting of recovered gas during the period y, in tons of CO_2e
$PE_{CO2,other-fuels,y}$	CO_2 emissions due to consumption of other fuels than the recovered gas due to the project activity during the period y, in tons of CO_2e
$PE_{EC,y}$	CO_2 emissions due to electricity consumption during the period y, in tons of CO_2e
$PE_{CH4,plants,y}$	CH_4 emissions from the project activity at the gas recovery facility and the gas processing plant during the period y, in tons of CO_2e
$PE_{CH4,pipeline,y}$	CH_4 emissions from the project activity during the transportation of the gas in pipelines under normal operating during the period y, in tons of CO_2e
$PE_{CH4,pipeline,accident}$	Methane emissions from the transport pipeline due to an accidental event, in tons of CO_2e

The relevant parameter values and the resultant total project emissions during the monitoring period in consideration are:

Parameter	**Unit**	**Value**			
		12/01/2011-31/12/2011	**01/01/2012-31/01/2012**	**02/01/2012-29/02/2012**	**Total**
$PE_{CO2,gas,y}$	tCO_2e	31,103.5	30,758.5	33,871.8	95,733.7
$PE_{CO2,other-fuels,y}$	tCO_2e	0	0	1	1
$PE_{EC,y}$	tCO_2e	1,269	1,177	1,718	4,164
$PE_{CH4,plants,y}$	tCO_2e	114	114	106	334
$PE_{CH4,pipeline,y}$	tCO_2e	9	9	8	26
$PE_{CH4,pipeline,accident}$	tCO_2e	0	0	0	0
$PE_{Total,y}$	**tCO_2e**	**32,496**	**32,057**	**35,705**	**100,259**

E.3. Leakage calculation

Not relevant, and set to zero (see PDD for justification).

E.4. Emission reductions calculation / table

Formula 15 in the determined PDD is used to determine the emission reduction:

(15)

$$ER_y = BL_y - PE_{CO2,gas,y} - PE_{CO2,other-fuels,y} - PE_{EC,y} - PE_{CH4,plants,y} - PE_{CH4,pipeline,y} - PE_{CH4,pipeline,accident} - L_y$$

Where:

ER_y	Emission reductions of the project activity during the period y, in tons of CO_{2e}
BL_y	Baseline emissions during the period y, in tCO_2
$PE_{CO2,gas,y}$	CO_2 emissions from the project activity due to combustion, flaring or venting of recovered gas during the period y, in tons of CO_2
$PE_{CO2,other-fuels,y}$	CO_2 emissions due to consumption of other fuels than the recovered gas due to the project activity during the period y, in tons of CO_2
$PE_{EC,y}$	CO_2 emissions due to electricity consumption during the period y, in tons of CO_2
$PE_{CH4,plants,y}$	CH_4 emissions from the project activity at the gas recovery facility and the gas processing plant during the period y, in tons of CO_{2e}
$PE_{CH4,pipeline,y}$	CH_4 emissions from the project activity during the transportation of the gas in pipelines under normal operating during the period y, in tons of CO_{2e}
$PE_{CH4,pipeline,accident}$	Methane emissions from the transport pipeline due to an accidental event, in tCO_{2e}
L_y	Leakage emissions during the period y, in tons of CO_2

The relevant parameter values and the resultant GHG emission reductions achieved during the monitoring period in consideration are:

Parameter	Unit	Value			
		12/01/2011-31/12/2011	01/01/2012-31/01/2012	02/01/2012-29/02/2012	Total
BL_y	tCO_2e	111,686.7	119,658.3	118,382.0	349,726.0
$PE_{CO2,gas,y}$	tCO_2e	31,103.5	30,758.5	33,871.8	95,733.7
$PE_{CO2,other-fuels,y}$	tCO_2e	0	0	1	1
$PE_{EC,y}$	tCO_2e	1,269	1,177	1,718	4,164
$PE_{CH4,plants,y}$	tCO_2e	114	114	106	334
$PE_{CH4,pipeline,y}$	tCO_2e	9	9	8	26
$PE_{CH4,pipeline,accident}$	tCO_2e	0	0	0	0
$PE_{Total,y}$	tCO_2e	32,495.5	32,058.5	35,704.8	100,258.7
L_y	tCO_2e	0	0	0	0
ER_y	**tCO_2e**	**79,191**	**87,599**	**82,676**	**249,467**

E.5. Comparison of actual emission reductions with estimates in the PDD

This section shall include a comparison of actual values of the emission reductions achieved during the monitoring period with the estimations in the registered PDD.

Item	Values applied in ex-ante calculation of the registered PDD	Actual values reached during the monitoring period
Emission reductions (tCO_2e)	593,711	249,467

E.6. Remarks on difference from estimated value in the PDD

The main reasons for lower emission reductions are the following: (i) the delay in start of construction of the project; and (ii) lower APG production volumes (as compared to the 2008 projections used for the ex ante estimates in the PDD).

Annex 1. Project commissioning act

Утв.постановлением Правительства РФ
от 24.11.2005г. № 698

Кому ООО "РН-Пурнефтегаз"
(наименование застройщика (фамилия, имя, отчество - для граждан, полное наименование организации - для юридических лиц),
629830, ЯНАО, г. Губкинский, мкр. 10, дом 3
его почтовый адрес и индекс)

РАЗРЕШЕНИЕ
на ввод объекта в эксплуатацию

№ СЛХ – 3001589 УВС/Э

Управление по недропользованию по Ямало-Ненецкому автономному округу
(наименование уполномоченного федерального органа исполнительной власти, или органа исполнительной власти субъекта Российской Федерации, или органа местного самоуправления, осуществляющих выдачу разрешения на строительство)

руководствуясь статьей 55 Градостроительного кодекса Российской Федерации разрешает ввод в эксплуатацию построенного, ~~реконструированного, отремонтированного~~ объекта капитального строительства
(ненужное зачеркнуть)

Сбор, подготовка и компримирование попутного нефтяного газа Комсомольского месторождения

ДКС "Комсомольская"
(наименование объекта капитального строительства в соответствии с проектной документацией,краткие проектные характеристики,

описание этапа строительства, реконструкции, если разрешение выдается на этап строительства, реконструкции)

расположенного по адресу: **Ямало-Ненецкий автономный округ, Пуровский район, Комсомольское месторождение**
(полный адрес объекта капитального строительства с указанием субъекта РФ, административного района и т.д. или строительный адрес)

Last page:

50	Внутриплощадочные сети связи и сигнализации	м	33980	33980	33980	33980
51	Внутриплощадочные сети противопожарного водоснабжения, в том числе	м	210	210	210	210
51.1	Система обогрева сетей пожаротушения.	м	2636	2636	2636	2636
52	Система охранного видеонаблюдения.	м	16560	16560	16560	16560
53	Узел подключения газопровода и технологических трубопроводов на УПСВ	м	366	366	366	366

Начальник Управления
по недропользованию по ЯНАО В.Б. Гуданаев
(должность уполномоченного сотрудника органа, осуществляющего выдачу разрешения на ввод) (подпись) (расшифровка подписи)

" 28 " ноября 2011 г.