CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 03 - in effect as of: 28 July 2006

CONTENTS

SECTION A. General description of project activity

A.1 Title of the project activity:

>> Flare gas recovery project at Uran plant, Oil and Natural Gas Corporation (ONGC) Limited,

Version 03, 5th October 2007

A.2. Description of the project activity:

>> Purpose

The project activity includes the installation of a tail gas recovery project that recycles all the tail gases otherwise being led to the flare system (which was sourced from 21 control valves, 242 pressure safety valves, 21 fuel gas purge points, seal purge gas released from compressors and expanders, tanks and other vessels) to put them back to the system in order to recover the valuable hydrocarbons and therefore reduce flaring to zero level. The purpose of the project activity is to recover and utilise this tail gas of about 30,000-150,000 standard cubic meters per day (SCMD) from gas processing plant at Uran in order to achieve technical zero flaring.

The purpose of the project is to:

- Reduce the wastage of precious natural resources
- Reduce the impact on the environment and safety of the locality / surrounding areas
- Achieve zero hydrocarbon emissions.
- Utilize recovered gas to produce value added products such as liquefied petroleum gas (LPG), naphtha, C2C3
- Reduce the emissions of greenhouse gases (GHG)'s into the atmosphere

The project activity has therefore reduced the release of CO_2 emissions into the atmosphere and has positively contributed to the fuel requirement of the country by providing additional source of relatively cleaner fuel (gas). The project has promoted sustainable economic growth and enabled conservation of environment and natural resources such as coal/ oil and other fossil fuels.

The project activity has further resulted in enhanced production of liquefied petroleum gas (LPG), naphtha and C2C3 from the recovered gas. This has facilitated reduced atmospheric pollution and conservation of non renewable natural resources.

- **Salient features of the project**

Oil and Natural Gas Corporation (ONGC) has several assets, basins and offshore platforms in the country. Uran Plant of ONGC is an on-shore installation (an oil and gas processing plant) located near the sea shore

at an average distance of about 205 Km from the Mumbai High offshore oil field. The plant is strategically located to handle the total offshore oil and part of gas produced in Mumbai High offshore oil field and adjoining basin.

Uran plant processes crude oil of about 20 million metric tons per annum (MMTPA) and gas quantity of 16 million metric standard cubic meters per day (MMSCMD) and 1600 cubic meter per day (CMD) of gas condensate. Crude oil and associated gas produced at Mumbai High and other satellite fields are transported to Uran through a 205 Km long sub sea pipeline from Mumbai High and 81 Km long sub sea pipeline from satellite fields. The crude oil is finally stabilized at the crude stabilisation (CSU) plant and water is separated out by de-hydrator before sending to storage tanks. Besides oil stabilisation, huge quantity of gas is processed at Uran to produce value added products like LPG, naphtha, C2C3 etc and rest lean gas is dispatched to various consumers through Gas Authority of India Limited (GAIL).

The Uran plant has an integrated gas flaring system (three flare systems) namely (a) Old flare stack system (an elevated flare stack system), (b) New flare stack system (an elevated standby flare stack system to the old flare) and (c) Box flare system (a ground flare system) besides the oil and gas processing facilities. The flare system receives gas from:

- 21 control valves and 242 pressure safety valves with their bypass valves to flare gas
- 21 fuel gas purge points to keep the flare alive to avoid air ingression and
- Seal purge gas released from various compressors and expanders, tanks and other vessels.

Through the above connections, valuable hydrocarbons were usually being flared continuously for safety reasons, also called as technical flaring which was to the tune of 30,000 SCMD to 150,000 SCMD depending upon the gas in the flare header, connected to various control valves, PSVs, fuel gas purge lines, seal purge gas of various compressor and expanders, and consumer lean gas supply net work.

The project activity i.e. the flare gas recovery unit (FGRU) has been implemented to recycle all of the above previously flared gases and process them to recover valuable hydrocarbons in order to reduce the flaring to zero. The flare gas recovery compressor is connected to the integrated gas flaring system (Fig 1.1) and is designed to recover the gas normally flared through this network. The FGRU consists of one-flare gas recovery screw compressor (oil flooded) with fixed speed drive and process complete with suction KOD, discharge KOD and cooler. The compressor is designed in a way that it is capable of handling gases

of molecular weight 19.5 to 36.2. Compressor loading is automatic through a loader valve which is PLC controlled and loading/ unloading is fast enough to recover the varying quantity of gas and maintain the flare header pressure.

- **Project's contribution to sustainable development**

The project has contributed to sustainable development in several ways by flare gas recovery for better applications and protecting the environment.

The project helps in minimising environmental pollution due to emissions of CO_2 and other air pollutants (SPM, SO_2, NO_x) otherwise released by flaring the gas in the atmosphere. The flare gas recovery system installed in the Uran complex had led to increased product (LPG, naphtha, C2C3 etc) outputs while conserving fossil fuels and reducing the GHGs.

The project has also contributed to local skilled employment opportunities, benefits to equipment suppliers (Compressors, separator, KOD, valves, pumps etc) and technical consultants. The project positively has benefited the people around the plants by reduced flaring related emissions and provided better occupational health and safety (OHS) at workplace.

The engineers at ONGC had to negotiate many technological challenges to implement zero gas flaring project in Uran. This is a first of its kind project in the country. ONGC believes their endeavour in reducing wastage of precious natural resources and converting the same to value added products will bolster India's continuous thrust towards a sustainable energy security.

A.3. Project participants:

>> Oil and Natural Gas Corporation Limited (ONGC) - Project Promoter

Name of Party involved	Private and/or public entity (ies) project participants	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/ No)
India (Host Country)	Oil and Natural Gas Corporation Limited (Public Entity)	NO

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

>>

A.4.1.1. Host Party(ies):

>> **India**

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

>> **Maharashtra**

A.4.1.3. City/Town/Community etc:

>> District: Raigad

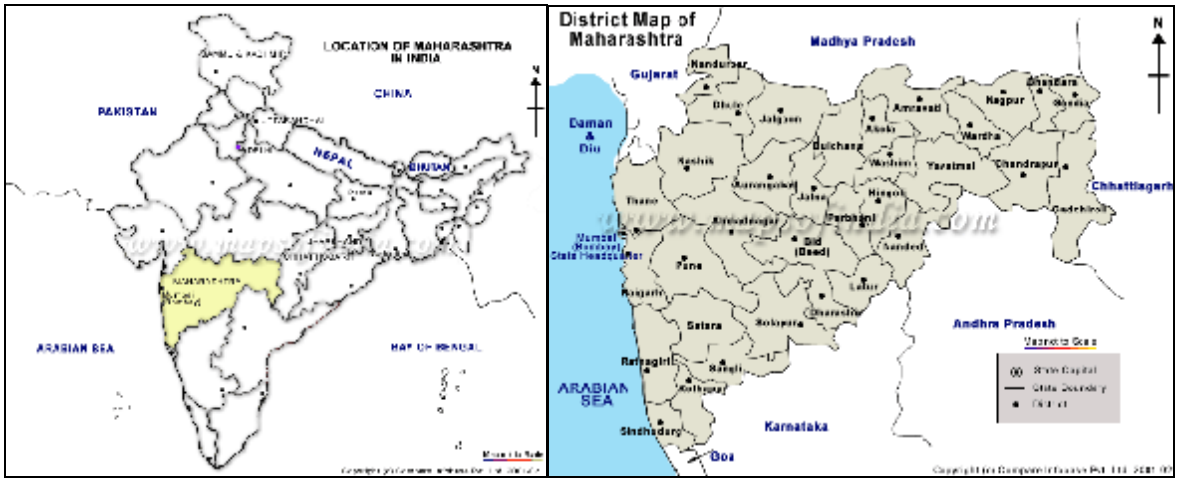
Town: Uran

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

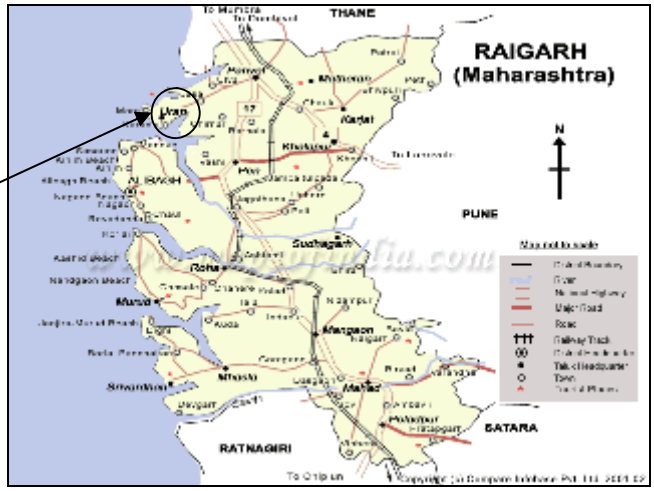
>> Uran Plant is an On-shore installation located at sea shore with an average distance of approximately 205 Km from the Mumbai High offshore field. The plant is strategically located as it handles total offshore oil and part of gas produced in Mumbai High offshore field and adjoining basin.

The unique identification characteristics of the place are further given below in a tabular format.

Latitude	Longitude	Altitude (m)
18° 52' 37 N	72° 56' 23 E	20



URAN



A.4.2. Category(ies) of project activity:

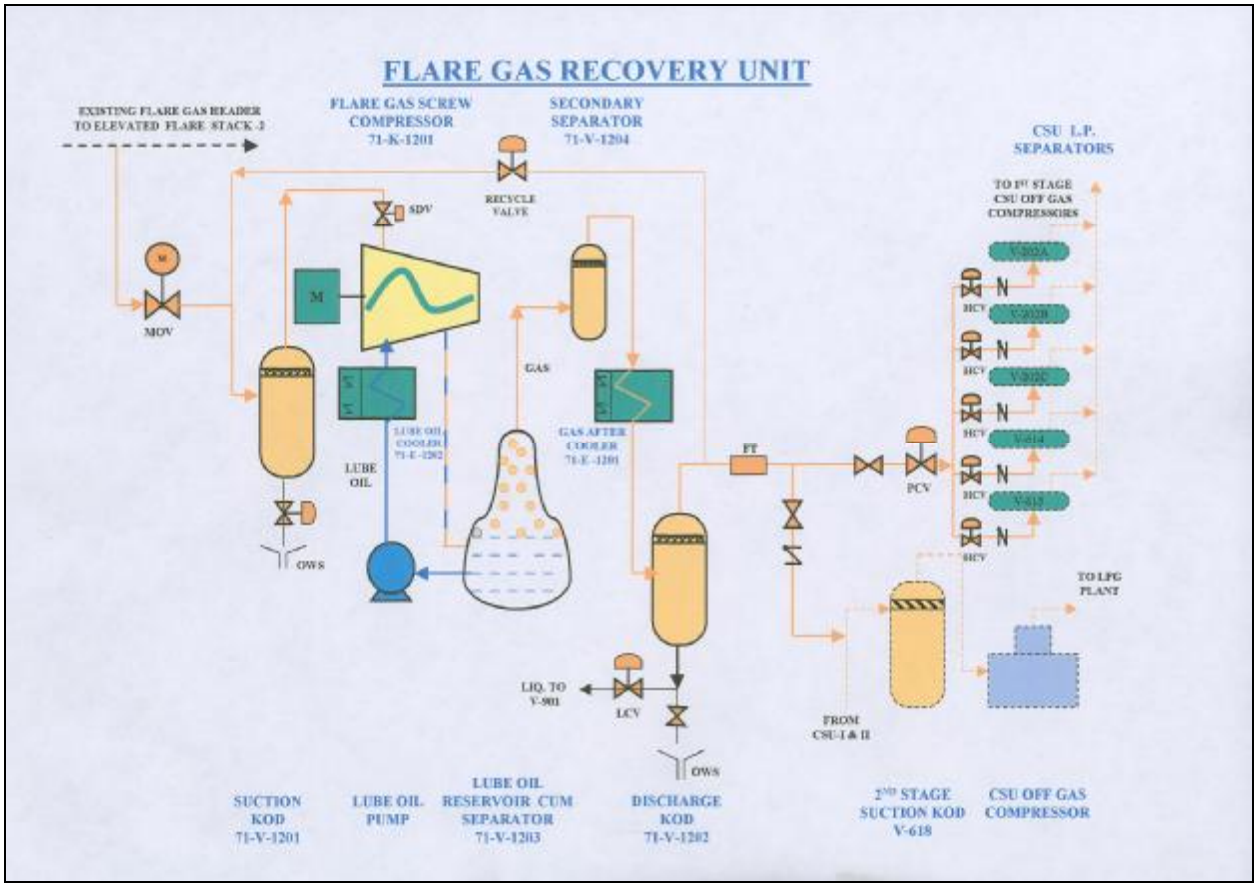
>> The project activity involves recovery and utilisation of tail gas from process plants and would be categorized under Sectoral Scope 10 'Fugitive emissions from fuels (solid, oil and gas)' as per the scope of the project activities enlisted in the 'Sectoral Scopes related approved methodologies and DOE' (Version 9 March 2005) for accreditation of operational entities.

A.4.3. Technology to be employed by the project activity:

>> Technology of project activity

Flare Gas Recovery Unit (FGRU) consists of-one flare gas recovery screw compressor (oil flooded) with fixed speed drive and process, complete with suction KOD, discharge KOD and cooler. Compressor is designed in such a way that it is capable of handing gases of molecular weight 19.5 to 36.2 (flare gas molecular weight varies as per flaring from different plant and sources). Compressor loading is automatic through a loader valve which is PLC controlled and loading/unloading is fast enough to recover the varying quantity of gas and maintain the flare header pressure. (FGRP is designed to recover the technical flaring only.

The project also involves laying of 1.5 Km pipeline from FGRU to processing facilities within the same plant.


FLARE GAS RECOVERY UNIT
EXISTING FLARE GAS HEADER TO ELEVATED FLARE STACK-3
FLARE GAS SCREW COMPRESSOR 71-K-1201
SECONDARY SEPARATOR 71-V-1204
CSU L.P. SEPARATORS
TO 1ST STAGE CSU OFF GAS COMPRESSORS
RECYCLE VALVE
SDV
MOV
GAS
LUBE OIL COOLER 71-E-1202
GAS AFTER COOLER 71-E-1201
LUBE OIL
OWS
FT
PCV
HCV
TO LPG PLANT
LIQ. TO V-901
LCV
FROM CSU-I & II
SUCTION KOD 71-V-1201
LUBE OIL PUMP
LUBE OIL RESERVOIR CUM SEPARATOR 71-V-1203
DISCHARGE KOD 71-V-1202
2ND STAGE SUCTION KOD V-618
CSU OFF GAS COMPRESSOR

A.4.4 Estimated amount of emission reductions over the chosen crediting period:

>> The project would result in a CO_2 emission reduction of approximately **977,405** tCO_2 at Uran plant during 2007 – 2017 (10 years) considering the avoidance of 44 MMSCM of gas per year at Uran plant when compared to the baseline.

Years	Annual estimation of emission reductions in tones of CO_2e
2007-08	97,740.5
2008-09	97,740.5
2009-10	97,740.5
2010-11	97,740.5
2011-12	97,740.5
2012-13	97,740.5
2013-14	97,740.5
2014-15	97,740.5
2015-16	97,740.5
2016-17	97,740.5
Total estimated reductions (tones of CO_2e)	**977,405**
Total number of crediting years	**10**
Annual average over the crediting period of estimated reductions (tonnes of CO2e)	**97,740.5**

A.4.5. Public funding of the project activity:

>> No public funding from parties included in Annex I is available to the project activity.

SECTION B. Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the project activity:

>> **Title of the methodology used:** The approved baseline and monitoring methodology AM0037 Version 01.1 would be used for this project activity "Flare reduction and gas utilization at oil and gas processing facilities"

Reference: This is UNFCCC approved methodology (AM0037) based on the project activity "Reduction of Flaring and Use of Recovered Gas for Methanol Production", whose baseline and monitoring methodology and project design document were prepared by MDL Ambient.

Tool for demonstration and assessment of additionality Version 02 is also applied to the project activity.

B.2 Justification of the choice of the methodology and why it is applicable to the project activity:

>> The project activity is tail gas flaring reduction project, which recovers otherwise unutilised and flared tail gas, generated because of various processes within the process plant and then convert the same to value added products like LPG, C2C3, naphtha and lean gas, which will be sold in the market.

The project fits in the sectoral scope 10 "Fugitive emissions from fuels (solid, oil and gas)". The approved methodology AM0037 "Flare reduction and gas utilization at oil and gas processing facilities" would be applicable to the project activity. The project activity satisfies the applicability criteria for AM0037 as provided below:

1. Tail gas from an oil or natural gas processing facility, used by the project activity, was flared and not vented for the last 3 years, prior to the start of the project
2. This previously-flared tail gas from the oil or natural gas processing plant is used to produce useful products such as LPG, C2C3, naphtha and lean gas. The surplus tail gas substitutes the same type of fuels/feedstock.
3. The tail gas is used in its own facility to produce products and is not used as a feedstock in a new facility. Since no displacement of production in an Annex 1 country is anticipated because of the project activity, this condition is not applicable to the project activity

4. The use of the tail gas by the project activity will not lead to an increase in fuel consumption outside of the project boundary.
5. Energy requirements for the project activity are primarily met using the previously-flared tail gas. There is no additional fossil fuel required for this project however if additional fossil fuel is required, these emissions should be counted as project emissions.
6. Accurate data on the quantity and carbon content on the tail gas are available.

The methodology is applied in the context of the project activity in the following ways:

- Project is a gas recovery, transport cum processing project
- The baseline is determined from actual quantity of gas recovered by the FGRU in the latest operating year (2005-06).

The gas flaring recovery project implemented at Uran plant has significantly reduced the CO2 emissions released into the environment. By means of the project, ONGC has achieved zero flaring at Uran plant.

The actual CO_2 emissions avoided by project depend on gas supplied from offshore field, and the fractional composition of gas.

Fractional composition of associated gas:

The CO_2 emission reduction calculation will depend on the carbon content of the gas that is recovered. The average fractional composition of the gas recovered from Uran plant is described below.

Table B 1 Chemical Analysis Report of Gas Recovered from Uran Plant

No	Composition	Values in (vol/vol%)
1	Methane	89.13
2	Ethane	5.06
3	Propane	3.48
4	I-Butane	0.63
5	N-Butane	0.78
6	I-Pentane	0.22

No	Composition	Values in (vol/vol%)
7	N-Pentane	0.18
8	Hexane	0.03
9	Heptane	0.00
10	Nitrogen	0.33
11	Carbon dioxide	0.17
12	Carbon content in kg-C/m^3	0.630

The baseline emission calculation has been done based on the actual volume of recovered gas and chemical composition as described above.

B.3. Description of the sources and gases included in the project boundary

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Source		Gas		Justification/Explanation
Baseline	Flaring	CO_2	Included	Main Source of emissions in baseline
		CH_4	Excluded	Assuming complete oxidation of tail gases, resulting in a more conservative baseline
		N_2O	Excluded	Assumed Negligible
	Fuel Consumption for tail gas transport	CO_2	Excluded	Conservative approach
		CH_4	Excluded	Assumed negligible
		N_2O	Excluded	Assumed negligible
	Fugitives resulting from tail gas transport	CO_2	Excluded	Assumed Negligible
		CH_4	Excluded	Conservative Approach
		N_2O	Excluded	Assumed Negligible
Project Activity	Fuel Consumption for tail gas transport	CO_2	Included	Recovered tail gas transportation by electric devices
		CH_4	Excluded	Assumed Negligible
		N_2O	Excluded	Assumed Negligible
	Fugitives resulting from tail gas transport	CO_2	Excluded	Assumed Negligible
		CH_4	Included	Recovered tail gas transported through pipeline
		N_2O	Excluded	Assumed Negligible
	Fugitive emissions from	CO_2	Excluded	Assumed negligible
		CH_4	Included	Will be included in case an accident occurs

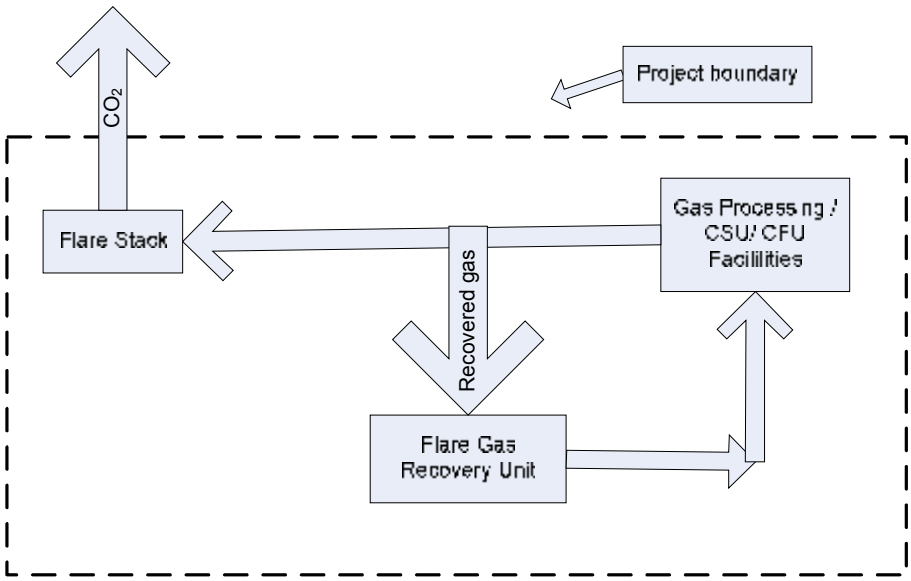
	accidents	N_2O	Excluded	Assumed negligible
	Additional Energy used by feedstock facility	CO_2	Included	Recovered tail gas is consumed within the plant
		CH_4	Excluded	Assumed Negligible
		N_2O	Excluded	Assumed Negligible

Project Boundary

The project boundary as per AM0037 methodology includes:

- The pipeline from the processing facility to the:
  - The site of the original tail gas flaring site;
  - The pipeline connecting the processing facility to the facilities utilizing the tail gas; and
  - The facility(ies) using the tail gas in the project activity.

Flow chart and project boundary is illustrated in the Fig B.1 shown below



B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

>> The procedure for selection of most plausible baseline scenarios is as below:

Step 1: Identify all realistic & credible alternative scenarios to the proposed project activity and eliminate alternative that do not comply with legal or regulatory requirements. The alternatives identified by the project proponent are as follows:

- Option 1: Flaring at the oil or gas processing site.
- Option 2: On-site consumption of tail gas for energy.
- Option 3: Injection of tail gas into oil reservoir.
- Option 4: Tail gas is used as a fuel and/or feedstock at offsite facility.
- Option 5: Another source of feedstock, other than the tail gas, is used at the end use facility where the tail gas is used in the project activity. The list of feedstock for an existing end use facility should include the existing feedstock used.
- Option 6: Project activity (Recovery, transportation, processing and distribution of tail gas to end-users) not being registered as a CDM project activity.

All the above alternatives are in compliance with existing legal and regulatory requirements in the country.

Step 2: Assess the alternatives to the proposed project activity and eliminate alternatives that face prohibitive barriers.

The common set of barriers identified to analyse the alternatives are listed below:

- Skilled and/or properly trained labour to operate and maintain the technology is not available and no education/training institution in the host country provides the needed skill, leading to equipment disrepair and malfunctioning.

- Lack of infrastructure (non availability of technological know-how, relevant in-house R&D facility, mitigating the design challenge) for implementation of the technology.

- Technical feasibility of the option.

Option 1: Flaring at the oil or gas processing site

Gas flaring is permitted legally in India and is therefore the easiest option that would form the baseline which apparently has no cost associated with it and therefore this is the most likely option. None of the barrier listed above hinders gas flaring in India.

Option 2: On-site consumption of tail gas for energy.

Uran's plants captive power requirements are met by means of a NG based power plant whose gas consumption over the years has been constant. Further, consumption of the recovered tail gas in the CPP in place of NG will not lead to any demonstrable emission reduction, since both of them are cleaner fuel of similar carbon intensity. Therefore onsite consumption of additional tail gas for energy related purpose is not envisaged and not a project option.

Option 3: Injection of tail gas into oil reservoir

General techniques/methods of gas flaring reduction include use of associated gas for local / on-site re-injection. The gas re-injection involves re-injection of gas into an underground reservoir containing both crude oil and gas in order to increase the pressure within the reservoir and induce the flow of oil. This method can be done at remote/ isolated oil fields, which does not have market for gas. Therefore gas that need not be flared can be injected into reservoirs to supplement recovery by maintaining reservoir pressure. Gas re-injection aims at reducing and eliminating flaring from existing plants and to increases oil production by recovering and re-injecting gas.

This project option is not viable as it is technically as well as economically not feasible to transport the gas through pipeline from Uran plant to offshore fields (which are about 205 kms away from the Uran plant), without enhancing its pressure. This option is thus not further evaluated owing to its technical non-feasibility.

Option 4: Tail gas is used as a fuel and/or feedstock at offsite facility

The recovered gas being semi rich, ONGC extracts value added products from the recovered gas. ONGC does not intend to supply this semi rich gas to any offsite facility. Therefore this option is not a viable option.

Option 5: Another source of feedstock, other than the tail gas, is used at the end use facility where the tail gas is used in the project activity. The list of feedstock for an existing end use facility should include the existing feedstock used.

There is no other source and therefore this option is not relevant.

Option 6: Project activity ((Recovery, transportation, processing and distribution of tail gas to end-users) not being registered as a CDM project activity

If the proposed project activity runs as designed it would have favourable economic returns, but the technological uncertainties associated with the project activity may result in production stoppages/ losses, additional maintenance and operating expenses. Also the equipments used for the project activity have been imported, requiring specialized personnel for repair and maintenance, needs importing of spares for consistently operating the unit successfully will result in long lead times. This in turn would further hamper the sustainability of the project activity in the long run. The project without CDM is not a attractive project option considering the technological risks and uncertainties involved during its operation.

Step 3: Determine the most likely alternative (baseline scenario)

As demonstrated in steps 1 & 2, Option 1 i.e. 'Flaring of gas at oil and gas processing site' is the only plausible baseline scenario.

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality):

>> The project activity involves "avoidance of gas flaring" by means of recovering the gas by installing flare gas recovery unit at Uran plant, and transporting the same within the same plant with the help of a 1.5 km pipeline laid up to a gas processing unit, where the gas is further processed to produce valuable products (LPG, dry/lean gas, C_2C_3, naphtha).

As per the decision 17/cp.7 Para 43, a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity. The project proponent is required to establish that the project activity is

additional and therefore not the baseline scenario, for which the additionality[1] of project activity as described in the selected methodology (AM0037), is discussed further.

The ONGC management was well aware of the Clean Development Mechanism (CDM) and evidence of the same will be produced to the DOE.

Step 1: Identification of alternatives to the project activity consistent with mandatory laws and regulations

Sub-step 1a. Define alternatives to the project activity:

The following options have been identified:

- Option 1: Flaring at the oil or gas processing site.
- Option 2: On-site consumption of tail gas for energy.
- Option 3: Injection of tail gas into oil reservoir.
- Option 4: Tail gas is used as a fuel and/or feedstock at offsite facility.
- Option 5: Another source of feedstock, other than the tail gas, is used at the end use facility where the tail gas is used in the project activity. The list of feedstock for an existing end use facility should include the existing feedstock used.
- Option 6: Project activity (Recovery, transportation, processing and distribution of tail gas to end-users) not being registered as a CDM project activity.

Sub-step 1b. Consistency with mandatory laws and regulations:

Each of these alternatives is in compliance with local regulations.

As discussed in Section B.3, all the alternatives were evaluated and Option1, i.e. 'Flaring of gas at Oil and gas processing site' has been considered as the most plausible baseline scenario.

Step 2. Investment analysis

This step is not selected for the purpose of additionality justification.

[1] The additionality has been assessed as per the latest Version 3 of "Tool for the demonstration and assessment of additionality"

Step 3: Barrier analysis

This step is used to determine whether the project activity faces barriers that (a) prevent the implementation of this type of the project activity and (b) do not prevent the implementation of at-least one of the alternatives.

Substep 3(a) Identify barriers that would prevent the implementation of this type of the project activity Barriers may include (i) Investment barriers (ii) Technological barriers (iii) prevailing practice barriers (iv) Other barriers

(i) Technological barriers:

The project activity will be considered additional on technical grounds if the following technological barriers are encountered by the project proponent

- Skilled and/or properly trained labour to operate and maintain the technology is not available and no education/training institution in the host country provides the needed skill, leading to equipment disrepair and malfunctioning.
- Lack of infrastructure for implementation of the technology.
- Technical feasibility of the option

The project has been conceived by the ONGC personnel working at Uran plant during 2001-2003 and there were several technical challenges faced during conceptualisation, pilot testing, implementation and operation. This project being first of its kind, engineers of ONGC had to undergo vigorous study of system and resources before and after the award of work. The compressor system was to be designed for a capacity ranging from 10% to 100% loading since the gas availability in flare header has wide fluctuations. The screw compressor was to be selected to suit to this wide range including the following:

- To have the operating capacity of compressor ranging from 15,000 to 1,50,000 SCMD with turn down ratio of 10%.
- To recover gas containing molecular weights ranging from 19.45 to 35.48.
- With suction pressure ranging from 50 mmwc to 2750 mmwc.

- Necessity of continuous operation of compressor due to wide fluctuation of gas availability
- Automatic loading and unloading depending on the availability of gas

Having limited proven track record for such flare gas recovery system, screw compressor manufacturers/suppliers were not easily available in the world market. ONGC engineers, had to undergo elaborated discussions / negotiations and critical situations while finalizing the compressor vendor. The positive displacement, variable capacity, oil flooded, rotary screw compressor was provided by M/s Howden Compressor U.K. Skilled labour to operate and maintain the technology is not easily available in India and therefore ONGC, Uran plant have to depend on the equipment supplier/ vendor during equipment repair and maintenance.

Further the project is facing many operational/technical hurdles during the operation of the FGRU. The unit had to face multiple shutdowns and had to face considerable stoppage time since ONGC was unfamiliar with the technology and had to depend on technology supplier for repair and maintenance. Some major operational hurdles faced by the unit are described below in brief[2].

- Shutdown due to damage of axial displacement sensing probe for rotor displacement.
- Frequent tripping of compressor owing to higher temperature of the thrust bearing.
- Disruption of operation owing to the damage of lube oil cooler fan.
- Disruption of operation because of leakage of lube oil pumps
- Disruption of operation owing to higher vibration of the oil and gas cooler fans.

The unit has to undergo multiple modifications to overcome various operational hurdles faced during the actual operation of FGRU which were hitherto unknown to project developer. These modifications are briefly described below.

- One gear pump was provided along with a separate ¼" tubing from this pump to loader/unloader valves to charge the lube oil to oil tank separator to avoid the use of main lube oil pump for unloading the compressor. This modification was required to avoid damage of the seal and to improve the efficiency of unloading
- Whenever compressor is shut down for a long time or to be started after system depressurization for maintenance purpose, there is no pressure in oil tank separator as a result lube oil pump did not get

[2] For details please see enclosure 2- Communications between ONGC and Technology supplier

sufficient liquid pressure at the suction of the pump. This gave lot of vibration and abnormal sound in the lube oil pump. To provided required liquid pressure at the suction of the pump to the lube oil pump at the startup of the compressor, a ¼ " tubing was given to oil tank separator from fuel gas header. If the pressure in the oil tank separator is less than 1 kg/cm2G then it is first pressurized to minimum 1 kg/cm2g and then lube oil pump is stared.

- The NRV is provided on the suction line of the compressor. This NRV has to function at very low pressure (150 to 250 mm water column). After few days of commissioning, this NRV started malfunctioning as a result there was wide fluctuation in suction pressure. Moreover system used to get depressurized when the compressor is stopped or tripped. Vendor was called to look into the problem. It was found that valve seat was damaged and counter weight was imbalanced. Necessary repairs and adjustment was done.
- Lube oil pumps seal was damaging frequently. They were modified.

This further illustrates the risk taken up by ONGC in terms of new technology which was being implemented for the first time in ONGC.

(ii) Barriers to prevailing practice:

This project is the first of its kind in the country and as a recognition for the pioneering effort has received the National Petroleum Management Program (NPMP) award for Excellence in 'Creativity and Innovation' for the year 2003-04[3].

Considering the above, the project involving gas flaring reduction is additional and not the baseline.

Step 4: Common Practice Analysis

No similar project has been taken up in the region prior to the implementation of the project activity and the project proponent has taken initiative in the region to recover tail gas and thus reduce the green house gas emission into the atmosphere.

Therefore the additionality assessment clearly demonstrate that the project involving gas flaring reduction is additional and not the baseline.

[3] Enclosure 4: Certificate of Recognition

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

>>

The procedure followed for estimating the emissions reductions from this project activity during the crediting period are as per the following steps which corresponds with AM0037 methodology.

Baseline Emissions:

In calculating baseline emissions, it is assumed that the recovered gas would be flared in the absence of the project. It is also assumed that all carbon in the tail gas (i.e. in methane and other gases including other hydrocarbons, CO, and CO2) is completely oxidized to carbon dioxide. Baseline emissions are calculated as follows in Equation 1.

$$BE_y = \left(V_y \times w_{carbon,y} \times \frac{44}{12} \right) \times \frac{1}{1000} \qquad (1)$$

Where,

BE_y	Baseline emissions during the year y (t CO2-e/yr)
V_y	The volume of tail gas utilized in year y at intake point to end use facility (m3)
$W_{carbon,y}$	The carbon content of tail gas flared in year y (t C/m3)

Project Emissions:

Project emissions would occur if fossil fuel were consumed in the process of transporting the gas to its new end use and any resulting fugitive emissions6 from its transport. Project emissions can be calculated as follows in Equation 2.

$$PE_y = \left(FCT_y \times EFFCT_y \times V_y \right) + \left(FE_y \right) + \left(EFA_y \right) + FFU_{y_y} \qquad (2)$$

Where,

PE_y	:	Project emissions in year y (tCO_2-e/yr)
FCT_y	:	Energy or fuel consumed for transportation to flare per unit volume of tail gas in year y (m^3/m^3)
$EFFCT_y$	:	Emission factor for fuel or energy used for transportation of tail gas to flare in year y (tCO_2/m^3)
V_y	:	The volume of tail gas utilized in year y (m3)
FE_y	:	Fugitive methane emissions along the transportation path to the end use facility (tCO_2-e/yr)
EFA_y	:	Fugitive emissions of CH4 from accidents
FFUy	:	Additional energy may be used by the end use facility that utilizes the tail gas (e.g., grid electricity or other fossil fuels besides tail gas) (t CO2-e)

Fugitive CH4 emissions along the transportation path to the end use facility (FEy) :

Fugitive CH4 emissions occurring during the transport of the gas in pipelines are estimated as per IPCC GPG 2000, the appropriate refined Tier 1 emission factors in Table 2.16 of the IPCC GPG has been applied.

The formula applied to calculate the emission is as follows.

$$PE_{CH4,pipeline,y} = GWP_{CH4} \times Emission\ Factor \times Length\ of\ Pipeline \quad (3)$$

Additional energy used by end-use facility(FFUy):

$$FFU_y = QF_y * EF_{facility,y} \quad (4)$$

Where,

QF_y	:	Energy or fuel consumed by end use facility in year y in m3,
$EF_{facility,y}$	:	Emissions factor for fuel or energy used by end use facility in year y t $CO_2/m3$

CH4 emissions from the transport of the gas in pipelines when accidental event occurs (EFAy) :

$$EFA_y = GWP_{CH4} \times \frac{1}{1000} \times \left(V_{accident} + V_{remain,accident}\right) \times W_{CH4\,pipeline.accident} \quad (5)$$

With

$$V_{accident} = t_{accident} \times F = \left(t_2 - t_1\right) \times F \quad \textbf{(6)}$$

$$V_{remain,accident} = d^2 \times \pi \times L \times \frac{P_p}{P_s} \times \frac{T_s}{T_p} \times \frac{V_{d,accident}}{\sum_i V_{Xi,d,accident}} \quad (7)$$

Where:

EFA_y	Are the CH_4 emissions from the project activity due to transport of the recovered gas in the pipeline when the accidental event happens in tons of CO_2 equivalent.
GWP_{CH4}	Is the approved Global Warming Potential for methane
$V_{accident}$	The volume of tail gas supplied to the pipeline from the oil and natural gas processing plant from the time the gas leakage started until the shutdown valves were closed (m^3)
$V_{remain, accident}$	The volume of tail gas remaining in the pipeline after the shutdown valves have been closed (m^3)
$W_{CH4, pipeline, accident}$	The fraction of methane in the tail gas on a mass basis (kg CH_4/m^3)
$T_{accident}$	Is the time difference between t_1 and t_2 determined as "retention time" in seconds
T_1	Is the time the gas leakage caused by the accident occurred. "t_1" is determined based on the continuous monitoring data such as pressure etc
T_2	Is the time that the shutdown valves closed both the upstream and downstream pipeline "t_2" is determined based on the operation data.
F	Is the flow rate of gas supplied from the FGRU to process plant in Figure B1 in m^3/second
D	Is the radius of the pipeline in meters. The data is derived from P & I (Piping and Instrument) diagram
Π	Is the ratio of the circumference of a circle to its diameter
L	Is the length of the pipeline in meters? The data is derived from P & I (Piping and Instrument) diagram
Pp	Is the pressure in the pipeline when the shutdown valves close both the upstream and downstream of the pipeline in atmospheres (atm).
Ps	Is the standard pressure in atm.
Tp	Is the temperature in the pipeline when the shutdown valves close both the upstream and downstream of the pipeline in degrees Centigrade.
Ts	Is the standard temperature in Centigrade.
$V_{d, accident}$	The volume of tail gas supplied to the pipeline from the oil and natural gas processing plant before the accident occurs during the period (m^3).
$V_{xi,d,accident}$	The volume of gas supplied to the pipeline from other sources if any before the accident occurs during the period (m^3)

Leakage Emissions:

Leakage is expected to be negligible since fugitive methane for tail gas transportation emissions is not outside the control of the project participants.

Further in India there exist a demand supply gap in market for fossil fuels[4]. This means if not by the project proponent the equivalent amount ogf fossil fuel fuel would have been supplied by some other company. Thus the project activity will not lead to additional fuel consumption in the region.

Also it is highly unlikely that the fuels produced by the project activity will substitute fuels with a lower carbon intensity, since in the western region the power generaion through fossil fuel accounts for about 90% of the total energy generation for as per the latest published data.[5]

Thus on accounts of the above leakage emissions are expected to be negligible.

Emission Reductions:

Emission reductions are calculated as the difference between baseline and project emissions, taking into account any adjustments for leakage:

$$ER_y = BE_y - PE_y \qquad (8)$$

Where,

ER_y : Emission reductions during year y (tCO_2/yr)
BE_y : Baseline emission during year y (tCO_2/yr)
$PE_{,y}$: Project emission during year y (tCO_2/yr)

B.6.2. Data and parameters that are available at validation:

(Copy this table for each data and parameter)

Data / Parameter:	**GWP_{CH4}**
Data unit:	tCO2e/tCH4
Description:	Global warming potential for CH4
Source of data to be used:	IPCC
Value applied:	21

[4] Please refer to enclosure 3: Table 34 Production and imports of crude oil and petroleum products by MoPNG

[5] Data source: CEA: CO2 baseline database (Version 1.1)

Justification of the choice of data or description of measurement methods and procedures actually applied :	IPPC source is referred.
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	**$EF_{Pipeline}$**
Data unit:	Gg/year/Km
Description:	Fugitive emission factor for CH4 for transportation of recovered gas through pipeline
Source of data used:	IPCC.
Value applied:	0.0029
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC GPG 2000, the appropriate refined Tier 1 emission factors in Table 2.16 of the IPCC GPG has been applied.
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	**T_s**
Data unit:	^{0} Kelvin
Description:	Standard temperature 273 degree Kelvin
Source of data to be used:	
Value applied:	
Justification of the choice of data or description of measurement methods	

and procedures actually applied :	
Any comment:	

Data / Parameter:	**P_s**
Data unit:	Atm
Description:	Standard pressure, 1 atmosphere
Source of data to be used:	
Value applied:	
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	**d and L**
Data unit:	Meters
Description:	The flow rate of tail gas supplied from the oil and natural gas processing plant.
Source of data to be used:	d: The radius of the pipeline. L: The length of the pipeline.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	d: 0.125 m L:1542 m
Description of measurement methods and procedures to be applied:	audit of pertinent sections of pipeline
Monitoring Frequency	Once

QA/QC procedures to be applied:	None
Any comment:	Data archived: Crediting period + 2 yrs

B.6.3 Ex-ante calculation of emission reductions:

>>

Estimation of Baseline CO2 emission			
Parameter	**Values**	**Equation applied**	**Remarks**
V_y	44,340,865 m3/year	(1)	For detailed calculation please refer to Enclosure 1
$W_{carbon, y}$	0.63 Kg C/m^3	(1)	For detailed calculation please refer to Enclosure 1
BE_y	102,469.3 ton CO2/year	(1)	For detailed calculation please refer to Enclosure 1
Estimation of Project CO2 emission			
Parameter	**Values**	**Equation applied**	**Remarks**
FCT_y	0.0213 m3 of NG/m3 of gas recovered	(2)	For detailed calculation please refer to Enclosure 1
$EFFCT_y$	0.002 ton CO2/m^3 of NG combusted	(2)	For detailed calculation please refer to Enclosure 1
V_y	44,340,865 m^3/ year	(2)	For detailed calculation please refer to Enclosure 1
FE_y	93.91 ton CO2/year	(2) and (3)	For detailed calculation please refer to Enclosure 1
EFA_y	0	(2), (5), (6) and (7)	For detailed calculation please refer to Enclosure 1
FFUy	2754.44	(4)	
PE_y	4728.79 ton CO^2/year	(2)	For detailed calculation please refer to Enclosure 1
Estimation of Emission Reduction			
ER_y	**97740.5 ton**	**(8)**	For detailed calculation please refer to Enclosure 1

B.6.4 Summary of the ex-ante estimation of emission reductions:

>>

Year	Estimation of Project activity Emission reductions (tonnes of CO_2 e)	Estimation of baseline emission reductions (tonnes of CO_2 e)	Estimation of emission reductions (tonnes of CO_2 e)
2007-08	4,728.8	102,469.3	97,740.5
2008-09	4,728.8	102,469.3	97,740.5
2009-10	4,728.8	102,469.3	97,740.5
2010-11	4,728.8	102,469.3	97,740.5
2011-12	4,728.8	102,469.3	97,740.5
2012-13	4,728.8	102,469.3	97,740.5
2013-14	4,728.8	102,469.3	97,740.5
2014-15	4,728.8	102,469.3	97,740.5
2015-16	4,728.8	102,469.3	97,740.5
2016-17	4,728.8	102,469.3	97,740.5
Total (tonnes Of CO_2 e)	**47,288**	**1,024,693**	**977,405**

B.7 Application of the monitoring methodology and description of the monitoring plan:

B.7.1 Data and parameters monitored:

Data and parameters to be monitored for calculating emission reduction:

Data / Parameter:	**V_y**
Data unit:	m3/year
Description:	The volume of tail gas recovered/ utilized in year y
Source of data to be used:	Plant.

Value of data applied for the purpose of calculating expected emission reductions in section B.5	44,340,865
Description of measurement methods and procedures to be applied:	Data should be measured using accurate and calibrated flow meters. Measurements should be taken at the point that tail gas enters the pipeline for transport to the flare (in the baseline scenario) or enters the pipeline for transport to the end use facility (in the case of the project scenario). Data can be collected in conjunction with F.
Monitoring Frequency	Continuous
QA/QC procedures to be applied:	Volume of gas should be completely metered with regular calibration of metering equipment, similar to what is called for in other approved methodologies.
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	$\mathbf{W}_{\mathbf{carbon, y}}$
Data unit:	t C/m3
Description:	The carbon content of tail gas flared in year y.
Source of data to be used:	Chemical analysis (e.g., gas chromatography), Plant.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.00063
Description of measurement methods and procedures to be applied:	Analysis can be performed in conjunction with measurement of the methane content of the tail gas ($w_{CH4,pipeline}$)
Monitoring Frequency	Weekly
QA/QC procedures to be applied:	Carbon content of gas should be crossed checked with previous

	months' data as well as with the owners of the oil and gas processing plant.
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	**FCT_y**
Data unit:	m3/m3
Description:	Energy or fuel consumed for transportation (e.g., for pipeline compressor) per unit volume of tail gas in project year y
Source of data to be used:	Flow meter data for gaseous fuels, or electricity meter in combination with flow rate data for tail gas sent to flare.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.0213
Description of measurement methods and procedures to be applied:	Measurement requires collecting simultaneous data on energy/fuel use and tail gas flow rates to produce a fuel consumption rate per unit of tail gas flared.
Monitoring frequency	Continuous
QA/QC procedures to be applied:	Meters must be properly calibrated and tested.
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	**EFFCTy**
Data unit:	tCO2/m3
Description:	Emissions factor for fuel used for transportation of tail gas to flare in Project year y
Source of data to be used:	Fuel characteristics, IPPC and plant.

Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.002
Description of measurement methods and procedures to be applied:	Where self-generation occurs emissions should be based on actual fuel consumption and carbon content data.
Monitoring Frequency	Annually
QA/QC procedures to be applied:	The emission factor calculation will be based on calorific value of the fuel.
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	**$W_{CH4, pipeline, accident}$**
Data unit:	Kg CH4/kg
Description:	The fraction of methane in the tail gas on a mass basis.
Source of data to be used:	Chemical analysis (e.g., gas chromatography), Plant.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.767
Description of measurement methods and procedures to be applied:	Analysis can be performed in conjunction with measurement of the carbon content of the tail gas ($w_{carbon, y}$)
Monitoring Frequency	Weekly
QA/QC procedures to be applied:	Methane content of gas should be crossed checked with previous months' data as well as with the owners of the oil and gas processing plant.
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	**t1 and t2**
Data unit:	Sec
Description:	t1: The time the gas leakage caused by the accident occurred. t2: The time that the shutdown valves closed both the upstream and downstream pipeline.
Source of data to be used:	Plant records.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	None
Monitoring Frequency	Once per event
QA/QC procedures to be applied:	None
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	**F**
Data unit:	m3/sec
Description:	The flow rate of tail gas supplied from the oil and natural gas processing plant.
Source of data to be used:	Flow meter at the plant.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	1.5

Description of measurement methods and procedures to be applied:	Data should be measured using accurate and calibrated flow meters. Measurements should be taken at the point that tail gas enters the pipeline for transport to the end use facility (in the case of the project scenario). Data can be collected in conjunction with V_{y}.
Monitoring Frequency	Continuous
QA/QC procedures to be applied:	Volume of gas should be completely metered with regular calibration of metering equipment, similar to what is called for in other approved methodologies.
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	**T_{p}**
Data unit:	ºC
Description:	The temperature in the pipeline when the shutdown valves close both the upstream and downstream of the pipeline.
Source of data to be used:	Temperature meter, Plant.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	Reading of meter by operational staff and recording into log and database
Monitoring Frequency	When an accident causes gas leakage from a pipeline, the gas leakage volume is less than the sum of (1) the total amount of gas that flowed during the time the accident occurred until the gas flow is shut and (2) the total amount of gas remaining in the pipeline. Therefore, the temperature of the gas in the pipeline needs to be measured only when the shutdown valves close.

QA/QC procedures to be applied:	Consistency checks of measurement with operation data
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	**P_p**
Data unit:	Atm
Description:	Pp is the pressure in the pipeline when the shutdown valves close both the upstream and downstream of the pipeline in atmospheres.
Source of data to be used:	Pressure meter, Plant.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	Monitoring procedure: Reading of meter by operational staff and recording into log and database
Monitoring Frequency	Once when the shutdown valves close
QA/QC procedures to be applied:	Consistency checks of measurement with operation data
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	**$V_{d\ accident}$**
Data unit:	m3
Description:	The volume of tail gas supplied to the pipeline from the oil and natural gas processing plant before the accident occurs during the period day
Source of data to be used:	Orifice meter.

Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	Reading of meter by operational staff and recording into log and database.
Monitoring Frequency	Continuously
QA/QC procedures to be applied:	Consistency checks of measurements with commercial data
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	$V_{xi, d, accident}$
Data unit:	M^3
Description:	The volume of gas supplied to the pipeline from other sources if any before the accident occurs during the period day.
Source of data to be used:	Orifice meter.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	Reading of meter by operational staff and recording into log and database.
Monitoring Frequency	Continuously
QA/QC procedures to be applied:	Consistency checks of measurements with commercial data
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	QF_y

Data unit:	M^3
Description:	Fuel consumed by end use facility in year y
Source of data to be used:	flow meter data
Value of data applied for the purpose of calculating expected emission reductions in section B.5	44,340,865
Description of measurement methods and procedures to be applied:	Measurement requires collecting simultaneous data on fuel use and tail gas flow rates to produce a fuel consumption rate per unit of tail gas sent to end use facility.
Monitoring Frequency	Continuously
QA/QC procedures to be applied:	Meters must be properly calibrated and tested.
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	$EF_{facility,y}$
Data unit:	Ton CO2/M^3
Description:	Emissions factor for fuel or energy used by end use facility in year y
Source of data to be used:	IPCC default and plant data
Value of data applied for the purpose of calculating expected emission reductions in section B.5	$6.2 * 10^{-5}$
Description of measurement methods and procedures to be applied:	Where self-generation occurs emissions should be based on actual fuel consumption and carbon content data.
Monitoring Frequency	Annually

QA/QC procedures to be applied:	As per ACM002
Any comment:	Most recent and representative IPCC data should be used. Data will be archived for two years following the end of the crediting period.

Data / Parameter:	Purge points
Data unit:	number
Description:	Number of purge points, which were open during any particular year
Source of data to be used:	Uran plant (ONGC)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	8 out of a total quantity of 21
Description of measurement methods and procedures to be applied:	ISO – 14001 or similar procedure.
Monitoring Frequency	Monthly
QA/QC procedures to be applied:	ISO – 14001 or similar procedure.
Any comment:	

Data / Parameter:	Flow rate
Data unit:	Sm3/day
Description:	Purge gas flow rate
Source of data to be used:	Uran plant (ONGC)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	10,222

Description of measurement methods and procedures to be applied:	Reading of flow meter by operational staff and recording into log and database.
Monitoring Frequency	Continuously
QA/QC procedures to be applied:	Consistency checks with previous months data
Any comment:	Meters must be properly calibrated and tested.

B.7.2 Description of the monitoring plan:

>> Please refer Annex 4

B.8 Date of completion of the application of the baseline study and monitoring methodology and the name of the responsible person(s)/entity(ies)

>> 06/02/2007

ONGC Ltd and their associated experts

Contact Information:

ONGC Ltd, Uran Plant Uran District: Raigad Maharashtra: 400702 Telephone: (022) 2722 2816-20 Fax: (022) 2722 2811

ONGC, Uran Plant is part of the project participant listed in Annex 1.

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

>> 20/11/ 2001 (The date of awarding of contract to M/S Nicco Corporation Limited)

C.1.2. Expected operational lifetime of the project activity:

>> 18 years 0 months

C.2 Choice of the crediting period and related information:

C.2.1. Renewable crediting period

C.2.1.1. Starting date of the first crediting period:

>> Not Applicable

C.2.1.2. Length of the first crediting period:

>> Not Applicable

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>> Starting date: Crediting period will start from 15/09/2007 or the date of registration of the project activity, which ever is earlier.

C.2.2.2. Length:

>> Length (max 10 years) : 10 years 0 months

SECTION D. Environmental impacts

>>

D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

>>

Assessment of environmental impacts due to the project activity (the FGRU) is not required. However the impacts have been presented here.

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

>>

It was not mandatory to carry out environmental impact assessment (EIA) for the project as per the national legislations (EIA notification, 1994). However, the assessment of environmental impact due to the project activity has been carried out to understand if there are any significant environmental impacts.

The project is an environmentally friendly project as it improves the environmental condition in the surroundings by preventing the flaring of gas. However the environmental impacts from recovery and transport of gas due to installation of gas recovery system are listed below:

Report on Environmental Impact

The impact of the project on the environment occurs during two stages:

1. Construction phase
2. Operational phase

Impacts during construction phase

The impacts due to the construction of the project activity were very negligible as it only involved installation of equipments such as screw compressor, lube oil pump, separator etc. Extent of pipeline laid was negligible and therefore there was little or no impact.

Impacts during operational phase

The operational phase of the project activity involves recovery of gas which was otherwise flared. The environmental impacts would occur as a result of gas leakages in the event of pipeline rupture/ pinhole leakage which would release gaseous emissions into the atmosphere.

ONGC has installed safety devices and implemented the environmental management system (EMS) as per ISO 14001 at this plant. The environmental management plan (EMP) consists of measures to mitigate such emissions arising from normal, abnormal and emergency conditions.

SECTION E. Stakeholders' comments

>>

E.1. Brief description how comments by local stakeholders have been invited and compiled:

>> Identification of Stakeholders

The stakeholders identified for the project are as under.

- Local community or the village panchayat
- Industrial consumers of products of the gas processing plant
- Employees working at the process plant
- Ministry of Environment & Forest (MOEF), Government of India (GOI)
- Non-Governmental Organisations (NGOs)
- Consultants
- Equipment Suppliers

Stakeholders list includes the government and non-government parties, who are involved in the project at various stages. ONGC has communicated to the relevant stakeholders about the project. Further a stakeholder consultation meeting was organised on 25/08/2006. The summary of the above consultation are explained below.

E.2. Summary of the comments received:

>> Stakeholders Involvement

The project is an environmentally friendly project which enables improvement of the project local area where the gas was earlier being flared. It did not require any displacement of any local population. The project has therefore not caused any adverse social impacts on local population but has rather helped in improving their quality of life.

As a consumer of gas, several industries are stakeholders to the project. To some extent these consumers influence the commercial success of the project.

Project consultants were involved in the project to take care of various pre contract and post contract project activities like preparation of reports, preparation of engineering documents, preparation of tender documents, selection of vendors / suppliers, supervision of project implementation, successful commissioning and trial runs.

Equipment suppliers have supplied the equipments as per the specifications finalized for the project and were responsible for successful erection and commissioning of the same at the site.

Stakeholders' Comments

ONGC invited comments from various stakeholders. A summary of the same was given below.

Stake holders meeting for CDM project on flare gas recovery was held at Uran Plant on 25.08.2006. Representatives from Village Panchayat, Staff and officers Union, villagers etc attended the meeting. List of participants is enclosed.

Mr. B. R. K. Verma, Deputy General Manager (DGM) (Construction & Maintenance) explained the development of Uran plant since 1978 till date. He also explained the necessity of flare, source of flare gas and advantages of recovery of flare gas. Lastly process of clean development mechanism was discussed and contribution of flare gas recovery unit towards clean development was explained.

Shri Balkrishna Gharat, local resident and Mrs Sarika A. Gharat Sarpanch, Mathavali appreciated the efforts taken by ONGC to stop gas flaring which resulted in reduction in CO2 emission to atmosphere by implementing flare gas recovery system. They felt it should have been done earlier. They were explained that technology was not available earlier. Also, it was explained that several challenges were faced by ONGC in implementing this project.

Shri D H Gharat, Secretary, Petroleum Employees Union (PEU) asked whether zero flaring is implemented in other projects of ONGC. It was explained that zero gas flaring projects are implemented at Hazira, Offshore etc.

Mrs Sarika A. Gharat asked about the disadvantages of zero flaring and it was explained that there are absolutely no disadvantages of zero flaring.

Mr Arvind Gharat, member of PEU and employee of ONGC opined to have standby compressor to take care of zero flaring during maintenance of existing compressor. It was explained that issue of stand by machine was being taken up/ considered by the ONGC management. However, it was informed that spare rotor of compressor is available to reduce down time of compressor.

Mr M.K.Mitra, Vice President, Karamchari Sanghatana said such project should be given wide publicity so that other projects of ONGC will also implement the same.

Employees of ONGC at Uran Plant expressed their happiness about their involvement in CDM project which will bring credit and appreciation to Uran Plant as FGRU installed at Uran Plant is first of its kind in the country.

To conclude all stake holders complimented Uran Plant of ONGC for taking initiatives towards CDM project development and improving overall environment in and around Uran Plant. It was felt by every body that all relevant companies should implement CDM project.

The local community has expressed their happiness, as the project has avoided flaring and benefited them by increasing the productivity of the crop. The project has also provided employment opportunities to locals during the implementation of the project activity. So the project activity has provided both short term and long term benefits to the local population.

E.3. Report on how due account was taken of any comments received:

>>

All queries raised during stakeholder consultation process have been satisfactorily explained during the meeting. The details of which are explained above.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Oil and Natural Gas Corporation (ONGC) Ltd.
Street/P.O.Box:	Energy centre, 10 floor
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Represented by:	
Title:	General Manager
Salutation:	Mr.
Last Name:	Chakraborty
Middle Name:	-
First Name:	Ashok B.
Department:	Alternate Energy
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding is available in the project activity.

Annex 3

BASELINE INFORMATION

Table B 1 Chemical Analysis Report of Gas Recovered from Uran Plant

No	Composition	Values (vol/vol%)
1	Methane	89.13
2	Ethane	5.06
3	Propane	3.48
4	I-Butane	0.63
5	N-Butane	0.78
6	I-Pentane	0.22
7	N-Pentane	0.18
8	Hexane	0.03
9	Heptane	0.00
10	Nitrogen	0.33
11	Carbon dioxide	0.17
12	Carbon content in kg-C/m^3	0.630

Flare gas recovered from January 2006 to December 2006

Jan-06	SM^3	Feb-06	SM^3	Mar-06	SM^3	Apr-06	SM^3
1-Jan-06	93876	1-Feb-06	129659	1-Mar-06	117650	1-Apr-06	176312
2-Jan-06	140623	2-Feb-06	159458	2-Mar-06	137786	2-Apr-06	176032
3-Jan-06	115172	3-Feb-06	160682	3-Mar-06	100563	3-Apr-06	136670
4-Jan-06	129237	4-Feb-06	143613	4-Mar-06	120848	4-Apr-06	118394
5-Jan-06	135509	5-Feb-06	126521	5-Mar-06	145701	5-Apr-06	111372
6-Jan-06	115552	6-Feb-06	142328	6-Mar-06	180160	6-Apr-06	116531
7-Jan-06	113164	7-Feb-06	137244	7-Mar-06	153607	7-Apr-06	118353
8-Jan-06	122196	8-Feb-06	126537	8-Mar-06	134135	8-Apr-06	110284
9-Jan-06	119203	9-Feb-06	134831	9-Mar-06	164867	9-Apr-06	113064
10-Jan-06	228130	10-Feb-06	134981	10-Mar-06	158308	10-Apr-06	158308
11-Jan-06	209651	11-Feb-06	122899	11-Mar-06	117100	11-Apr-06	112663
12-Jan-06	87284	12-Feb-06	132659	12-Mar-06	129810	12-Apr-06	129810
13-Jan-06	25526	13-Feb-06	142384	13-Mar-06	131705	13-Apr-06	131705
14-Jan-06	65086	14-Feb-06	197265	14-Mar-06	157922	14-Apr-06	157922
15-Jan-06	203958	15-Feb-06	70256	15-Mar-06	121816	15-Apr-06	203286
16-Jan-06	183502	16-Feb-06	147308	16-Mar-06	116516	16-Apr-06	116516
17-Jan-06	140793	17-Feb-06	130871	17-Mar-06	116930	17-Apr-06	211401
18-Jan-06	178827	18-Feb-06	136467	18-Mar-06	125000	18-Apr-06	212196
19-Jan-06	179790	19-Feb-06	126167	19-Mar-06	114903	19-Apr-06	166073
20-Jan-06	205248	20-Feb-06	131460	20-Mar-06	121552	20-Apr-06	138702
21-Jan-06	150049	21-Feb-06	165395	21-Mar-06	167207	21-Apr-06	167207
22-Jan-06	118985	22-Feb-06	134546	22-Mar-06	145171	22-Apr-06	146990
23-Jan-06	121671	23-Feb-06	127389	23-Mar-06	153457	23-Apr-06	140910
24-Jan-06	115203	24-Feb-06	122315	24-Mar-06	133774	24-Apr-06	132679
25-Jan-06	151076	25-Feb-06	120237	25-Mar-06	163061	25-Apr-06	144937
26-Jan-06	111583	26-Feb-06	151851	26-Mar-06	157942	26-Apr-06	188422
27-Jan-06	116024	27-Feb-06	193234	27-Mar-06	146967	27-Apr-06	149958
28-Jan-06	159468	28-Feb-06	157964	28-Mar-06	158964	28-Apr-06	152052
29-Jan-06	152263			29-Mar-06	133754	29-Apr-06	28194
30-Jan-06	149007			30-Mar-06	173495	30-Apr-06	124884
31-Jan-06	134000			31-Mar-06	183390		
Total	**4271656**		**3906521**		**4384061**		**4291827**

Flare gas recovered from January 2006 to December 2006

May-06	SM^3	Jun-06	SM^3	Jul-06	SM^3	Aug-06	SM^3
1-May-06	189489	1-Jun-06	131340	1-Jul-06	123525	1-Aug-06	160964
2-May-06	189913	2-Jun-06	148415	2-Jul-06	122662	2-Aug-06	131099
3-May-06	189780	3-Jun-06	132610	3-Jul-06	131478	3-Aug-06	168588
4-May-06	189666	4-Jun-06	124672	4-Jul-06	111573	4-Aug-06	153904
5-May-06	171226	5-Jun-06	210786	5-Jul-06	104620	5-Aug-06	162798
6-May-06	135873	6-Jun-06	229974	6-Jul-06	149457	6-Aug-06	156680
7-May-06	119800	7-Jun-06	215489	7-Jul-06	162470	7-Aug-06	157402
8-May-06	136663	8-Jun-06	176236	8-Jul-06	150056	8-Aug-06	158195
9-May-06	185100	9-Jun-06	171066	9-Jul-06	139701	9-Aug-06	155086
10-May-06	146992	10-Jun-06	176983	10-Jul-06	142565	10-Aug-06	158606
11-May-06	165852	11-Jun-06	134450	11-Jul-06	159001	11-Aug-06	154242
12-May-06	111349	12-Jun-06	127654	12-Jul-06	146275	12-Aug-06	155022
13-May-06	151575	13-Jun-06	149694	13-Jul-06	150040	13-Aug-06	155062
14-May-06	134164	14-Jun-06	141796	14-Jul-06	139865	14-Aug-06	NIL
15-May-06	170066	15-Jun-06	127878	15-Jul-06	141611	15-Aug-06	174041
16-May-06	167205	16-Jun-06	124726	16-Jul-06	152879	16-Aug-06	170190
17-May-06	159704	17-Jun-06	127870	17-Jul-06	136720	17-Aug-06	165615
18-May-06	80570	18-Jun-06	154102	18-Jul-06	137997	18-Aug-06	159590
19-May-06	103769	19-Jun-06	38729	19-Jul-06	127485	19-Aug-06	156507
20-May-06	125615	20-Jun-06	NIL	20-Jul-06	130388	20-Aug-06	150892
21-May-06	118212	21-Jun-06	20720	21-Jul-06	128237	21-Aug-06	147090
22-May-06	133225	22-Jun-06	22490	22-Jul-06	138030	22-Aug-06	149436
23-May-06	121642	23-Jun-06	NIL	23-Jul-06	144614	23-Aug-06	164263
24-May-06	121638	24-Jun-06	NIL	24-Jul-06	173371	24-Aug-06	145003
25-May-06	162803	25-Jun-06	NIL	25-Jul-06	132940	25-Aug-06	143698
26-May-06	145581	26-Jun-06	NIL	26-Jul-06	134668	26-Aug-06	144154

27-May-06	141200	27-Jun-06	22490	27-Jul-06	136353	27-Aug-06	145777
28-May-06	155063	28-Jun-06	22490	28-Jul-06	135130	28-Aug-06	145577
29-May-06	170213	29-Jun-06	95931	29-Jul-06	129668	29-Aug-06	145365
30-May-06	145503	30-Jun-06	163592	30-Jul-06	143973	30-Aug-06	147295
31-May-06	113646			31-Jul-06	142954	31-Aug-06	151366
	4553097		**3192183**		**4300306**		**4633507**

Flare gas recovered from January 2006 to December 2006

Sep-06	SM^3	Oct-06	SM^3	Nov-06	SM^3	Dec-06	SM^3
1-Sep-06	143124	1-Oct-06	137475	1-Nov-06	110427	1-Dec-06	100788
2-Sep-06	141935	2-Oct-06	137123	2-Nov-06	110130	2-Dec-06	93491
3-Sep-06	149737	3-Oct-06	164982	3-Nov-06	106708	3-Dec-06	91810
4-Sep-06	141971	4-Oct-06	145736	4-Nov-06	135875	4-Dec-06	88983
5-Sep-06	63315	5-Oct-06	152761	5-Nov-06	134730	5-Dec-06	129804
6-Sep-06	22490	6-Oct-06	147372	6-Nov-06	83393	6-Dec-06	184749
7-Sep-06	22490	7-Oct-06	175845	7-Nov-06	18799	7-Dec-06	161362
8-Sep-06	84499	8-Oct-06	161035	8-Nov-06	21976	8-Dec-06	100080
9-Sep-06	156851	9-Oct-06	153324	9-Nov-06	14361	9-Dec-06	95307
10-Sep-06	179274	10-Oct-06	134017	10-Nov-06	37415	10-Dec-06	96858
11-Sep-06	160635	11-Oct-06	133189	11-Nov-06	131339	11-Dec-06	104276
12-Sep-06	158047	12-Oct-06	0	12-Nov-06	146653	12-Dec-06	93397
13-Sep-06	145862	13-Oct-06	19264	13-Nov-06	171746	13-Dec-06	101873
14-Sep-06	136362	14-Oct-06	0	14-Nov-06	166929	14-Dec-06	118057
15-Sep-06	141533	15-Oct-06	19264	15-Nov-06	95258	15-Dec-06	88827
16-Sep-06	151708	16-Oct-06	185013	16-Nov-06	82894	16-Dec-06	157512
17-Sep-06	131901	17-Oct-06	202954	17-Nov-06	91069	17-Dec-06	151635
18-Sep-06	128075	18-Oct-06	159916	18-Nov-06	116304	18-Dec-06	151161
19-Sep-06	144086	19-Oct-06	202451	19-Nov-06	87342	19-Dec-06	97959
20-Sep-06	139860	20-Oct-06	228661	20-Nov-06	84867	20-Dec-06	116309
21-Sep-06	158378	21-Oct-06	180963	21-Nov-06	89896	21-Dec-06	196067
22-Sep-06	145253	22-Oct-06	209770	22-Nov-06	79129	22-Dec-06	168737

23-Sep-06	144366	23-Oct-06	232805	23-Nov-06	109563	23-Dec-06	116699
24-Sep-06	140233	24-Oct-06	167968	24-Nov-06	88441	24-Dec-06	143341
25-Sep-06	140648	25-Oct-06	169399	25-Nov-06	96224	25-Dec-06	101909
26-Sep-06	140898	26-Oct-06	192225	26-Nov-06	89615	26-Dec-06	106248
27-Sep-06	134376	27-Oct-06	179691	27-Nov-06	86598	27-Dec-06	108568
28-Sep-06	132490	28-Oct-06	185952	28-Nov-06	92638	28-Dec-06	114328
29-Sep-06	140648	29-Oct-06	159775	29-Nov-06	85280	29-Dec-06	118401
30-Sep-06	140898	30-Oct-06	146992	30-Nov-06	83314	30-Dec-06	101174
		31-Oct-06	156228			31-Dec-06	130735
	3961943		**4642150**		**2848913**		**3730445**

Annex 4

MONITORING INFORMATION

The monitoring plan will be as per the AM0037 methodology. Further a detailed monitoring plan has been developed by ONGC specifically for the CDM project. This is mentioned below.

PROCEDURE FOR TRAINING MONITORING PERSONNEL

Purpose

To establish a system for training and awareness of staff on monitoring and recording of clean development mechanism (CDM) related data

Scope

Operational staff at ONGC, Uran whose work is related to flare gas recovery unit and flare system.

Responsibility

1. DGM (Gas Processing Group) is responsible for deciding the contents of training program.

2. DGM (Gas Processing Group) and Area Manager-Plant Operations are responsible for organizing, conducting training, supervising and maintaining training records.

Description

Sr. No.	Activity	Responsibility
1	Orientation/ induction training will be conducted for all new operational staff.	DGM (GPG)
2	Specialized training will be provided to operators, operating the flare gas recovery unit and for recording the parameters in accordance with the Monitoring and Verification (M&V) system as required by the CDM project design document (PDD)	Area Manager – Plant Operations
3	On job training will be conducted by Shift – in – Charge for operators. Supervision and follow up will be done to ensure that the operators are fully aware of the monitoring and recording requirements under CDM	Area Manager – Plant Operations and Shift – in – charge

4	In case of job rotation, it will be ensured that the operator on job is appropriately instructed and trained with respect to monitoring and recording of CDM data	Shift – in – charge
5	Training records will be maintained and initialled	Area Manager – Plant Operations
6	Feedback from trained operators shall be taken to ensure that their difficulties are understood. The shift – in – charge will ensure that such difficulties are attended to and if required the Area Manager-GPG shall also be involved	Shift-in-charge

Procedure for Emergency Preparedness and Response

Purpose

To establish a system to deal with emergency situations, in order to minimize hazards to the environment during the operation of the CDM project.

Scope

All activities and services related to the CDM project (Flare gas recovery unit and flare system)

Responsibility

1. DGM (GPG) and AM – Plant Opns are responsible for implementation of this procedure.
2. In charge Safety is responsible for conducting mock drill to maintain preparedness during emergency

Description

ISO procedure mentioned in URN/ISO/DIO/S007 “Onsite emergency control plan-2005-” will be followed

Procedure for Maintenance and Calibration of Monitoring Equipment

Purpose

To establish a system for maintaining and calibrating the monitoring equipments which record the parameters pertaining to the CDM project.

Scope

Monitoring equipments that record flare gas recovered, pipeline pressure and temperature transmitters.

Responsibility

1. DGM-Gas Processing Group and AM-Instruments are responsible for implementation of this procedure.

2. AM-Instruments is responsible for conducting regular checks on monitoring equipments to ensure its maintenance and to ensure the accuracy of measurements

Description

ISO procedure for calibration of instruments (No. URN/ISO/DIO/I 001 and I 002) is already in practice. In addition to this following activities will be carried out.

Sr. No.	Activity	Responsibility
1	All measurement devices will be microprocessor based, with best accuracy, procured from reputed manufacturers. The equipments should be calibrated as the reliability of the monitoring system is governed by the accuracy of the measurement system and quality of equipment used	AM-Instruments
2	Conduct regular/ periodic check on equipment performance at interval of once in 3 months for those equipments that are used to monitor the parameters related to the CDM project	AM-GPG and AM-Instruments
3	All instruments will be calibrated once in 6 months and marked at regular intervals so that the accuracy of measurements can be ensured at all times.	AM-Instruments
4.	All the instruments should carry tag plates. Records of calibration will be maintained in register.	AM-Instruments

Procedures for monitoring measurement and reporting

Purpose

To establish a procedure for monitoring measurements and reporting, as per the CDM requirements

Scope

All monitoring measurements and reports as per the monitoring and verification protocol defined in Section D3 of the CDM PDD.

Responsibilities

Shift-in-charge/ Area Shift- in - Charge has the overall responsibility for all measurements.

Description

Sr. No.	Activity	Responsibility
1	The various measurements that need to be observed and recorded will be identified as provided in Section D3 of the PDD	AM-GPG
2	The measurements of gas compressed, the data would be thus registered online in a control cabin through a micro-processor. Same will be recorded in register	Shift-In-Charge Area Shift- in – Charge
3	Existing practice of recording all the parameters will be followed.	Operator
4	Quality of gas compressed will analyzed once in a week and recorded	Shift Chemist

Procedures for handling of records

Purpose

To establish a procedure for handling of records pertaining to CDM project in order to ensure that they can be easily retrieved

Scope

All monitoring records and reports as required by the monitoring and verification protocol defined in Section D3 of the CDM PDD.

Responsibilities

Area Manager-Gas Processing Group and Maintenance Engineer (Mech, Elect, Inst) have the overall responsibility for record handling and maintenance.

Description

Sr. No.	Activity	Responsibility
1	Identify information/ data/ records that need to be maintained as per the CDM PDD and prepare a record matrix / list for records as per the M&V protocol of the CDM PDD including the details of its retention period	AM-GPG Maint Engr (Mech., Inst Elec)
3	Maintain active files / registers / books for this data indexed in a manner to enable easy retrieval of specific data / record.	AM-GPG Maint Engr (Mech., Inst Elec)
4	Ensure that the records are legible, are not lost / damaged and are kept in safe custody, with access to authorized personnel.	AM-GPG Maint Engr (Mech., Inst Elec)
5	Ensure that the records are kept at the known locations. Maintain an index of files / records at the locations for easy retrieval of the file / record	AM-GPG Maint Engr (Mech., Inst Elec)
6	Maintain data in active files for the retention period specified in the record matrix. Make available the records to the designated operational entity (DOE) within the retention period as agreed in the M&V protocol	AM-GPG Maint Engr (Mech., Inst Elec)
7	Review the records at the end of the retention period and decide on the records to be retained in archives and records to be disposed off.	AM-GPG Maint Engr (Mech., Inst Elec)Inst Maint

Procedures for reviewing reported results/ data

Purpose

To establish a procedure for reviewing reported measurements of parameters for CDM project in order to ensure that the data is available and is accurate

Scope

All monitoring records and reports as required by the monitoring and verification protocol defined in Section D3 of the CDM PDD.

Responsibilities

DGM (GPG) has the overall responsibility for reviewing records.

Description

Sr. No.	Activity	Responsibility
1	The monitored records will be reviewed for correctness once a month considering the accuracy requirements under CDM.	DGM (GPG)
2.	Data to be reviewed will include gas compressed, power consumed, quality of gas, gas used for power generation which is consumed. The review of data recorded, will be done in the presence of AM-GPG to check authenticity of recorded information.	DGM (GPG)
3.	It will be ensured that all the data required for CDM is available for verification. If there are any gaps/ deviations, the Manager (Operations) will inform the AM-Plant operation on the importance of recording all data and will preciseness and with clarity	DGM (GPG) and AM-Plant operation
4	Once all data is reviewed for correctness, it will be approved and initialed by the DGM (GPG) in the presence of AM-Plant Operation with deviations supported with authentic information. This document shall be kept available for verification by external parties	DGM (GPG)

Procedures for dealing with monitored data uncertainties and adjustments

Purpose

To establish a procedure for dealing with the monitored data uncertainties and adjustments

Scope

All monitoring records and reports as required by the monitoring and verification protocol defined in Section D3 of the CDM PDD.

Responsibilities

DGM (GPG) has the overall responsibility for dealing with monitored data

Description

Sr. No.	Activity	Responsibility
1	Uncertainties and adjustments to monitored data will be reviewed in the context of non-availability of certain data/ less clarity on recorded data. The AM-Plant operation will be consulted on the reasons for the same.	DGM (GPG) and AM-Plant operation
2.	Manager will suggest adjustments to such data in accordance with the explanation provided. Authentic information shall form the basis of adjustments to the data. Authentic document shall also be attached with recorded data in order to enable verification of the same	DGM (GPG) and AM-Plant operation

PROCEDURES FOR INTERNAL AUDIT OF GHG PROJECT COMPLIANCE

Purpose

To establish a procedure for an internal audit before actual verification of emission reductions

Scope

All monitoring records and reports as required by the monitoring and verification protocol defined in Section D3 of the CDM PDD.

Responsibilities

MR – ISO has the overall responsibility for organizing internal audit for checking the data recorded for CDM purpose

Description

Sr. No.	Activity	Responsibility
1	A special internal audit team (2-3 members) will be appointed by the GGM-HUP and Manager (Operations) to independently conduct internal audit of monitored data. The internal audit will be conducted once in 6 months. The audit timing will be at least 2 months prior to actual verification by external verifiers	MR – ISO
2.	The internal audit team will review all the records pertaining to gas recovered, quality of gas, power consumption, checking monitoring equipments for accuracy and whether calibration was performed.	MR – ISO
3.	The Area Manager-GPG in association with the AM-Plant Operations shall answer all the queries raised by the internal audit team	AM-GPG and AM-Plant Operations
4.	The internal audit team will produce an audit report providing details of concerns that need to be attended to immediately before actual verification by the external verifier. Internal auditor will produce a report within 3 working days indicating non-conformances	MR – ISO
5.	Area Manager-GPG will close the non-conformances within suitable time frame from the date of the internal audit report by proposing corrective actions	Area Manager GPG

Procedures for project conformance reviews

Purpose

To establish a procedure for project conformance review before submitting records to the external verifier

Scope

All monitoring records and reports as required by the monitoring and verification protocol defined in Section D3 of the CDM PDD.

Responsibilities

GGM-HUP and General Manager (Operations) have the overall responsibility of project conformance with CDM requirements

Description

Sr. No.	Activity	Responsibility
1	The internal audit report will be the basis for assessing whether the non-conformances of the project are closed. Monitored data and its authenticity will be checked by the GGM-HUP. Further a check will be performed on the project non-conformances that were reported during internal audit, in order to ensure that the project conforms to the requirements under CDM	HUP and Head Operations
2	The GGM-HUP will initial the records that could be produced to the external verifier for verification	HUP and Head Operations
3	DGM (GPG) will ensure that all the records and authentic documents are appropriately initiated by the GGM-HUP	DGM (GPG)

Procedures for Corrective actions

Purpose

To establish a procedure for taking corrective actions for ensuring accuracy for future monitoring and reporting

Scope

All monitoring records and reports as required by the monitoring and verification protocol defined in Section D3 of the CDM PDD.

Responsibilities

Area Manager GPG has the overall responsibility for ensuring that corrective actions are built in

Description

Sr. No.	Activity	Responsibility
1	The Area Manager GPG shall ensure that the corrective actions proposed by the internal audit team is built into the system so that errors in data collection/ monitoring/ recording are eliminated	Area Manager GPG
2	Area Manager GPG shall inform the AM-Plant Operations regarding the corrective actions and it's appropriate implementation in the future months	Area Manager GPG
3	AM-Plant Operations will take necessary corrective actions and report the same to the Manager who will further perform a check on the same	AM-Plant Operations
4.	Area Manager GPG will provide his acceptance on the corrective action implemented and document the same	Area Manager GPG

List of instruments to be calibrated

The following instruments is required to be calibrated for CDM. There frequency of calibration and record maintenance will be done as per existing ISO procedure.

Sl No	Description	Tag No
1.	Volume of gas recovered	71FT1201 / 71FQ1201
2	Pressure in the pipeline	71PI1201
3	Temperature in the pipeline	71TI1206

Appendix A
Abbreviations

AG	Associated Gas
AM	Approved Methodology
ASCV	Anti Surge Control Valve
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CPCB	Central Pollution Control Board
CPF	Central Processing Facility
CTF	Central Tank Farm
EF	Emission Factor
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMS	Environmental Management System
EPA	Environmental Protection Agency
ER	Emission Reduction
GHG	Green House Gas
GM	General Manager
GoI	Government of India
GWP	Global Warming Potential
HP	High Pressure
INR	Indian Rupees
IPCC	Intergovernmental Panel on Climate Change
Kg	Kilo gram
LP	Low Pressure
LPG	Liquefied Petroleum Gas
LSCM	Lac Standard Cubic Meter
MMSCM	Metric Million Standard Cubic Meter
MoEF	Ministry of Environment and Forest
MP	Medium Pressure
ONGC	Oil and Natural Gas Corporation
PDD	Project Design Document
PSV	Pressure Safety Valve
QA	Quality Assurance
QHSE	Quality Health Safety and Environment
TOC	Total Organic Compounds
UNFCCC	United Nation's Framework Convention on Climate Change

Appendix B
Reference List

Sl No	Reference
1	Kyoto Protocol to the United Nations Framework Convention For Climate Change(UNFCCC) www.unfccc.int/cdm
2	Website of United Nations Framework Convention For Climate Change(UNFCCC) http://unfccc.int
3	UNFCCC decision17/CP.7 : Modalities and procedures for a clean development mechanism as defined in article 12 of the Kyoto protocol
4	Report on NPMP team award for excellence in creativity and innovation 2003-2004.
6	Website of Climate Change Cell, Ministry of Environment and Forest, Government of India. www.envfor.nic.in
7	Oil & Natural Gas Corporation Ltd, ONGC Home, www.ongcindia.com
8	Website of Climate Change Cell, Ministry of Environment and Forest, Govt of India. www.envfor.nic.in
9	Website of Indiainfoline - www.indiainfoline.com
10	Website of the Maps of India – www.mapsofindia.com
11	Gas Flaring Reduction in the Indonesian Oil and Gas Sector – 'Technical and Economic Potential of Clean Development Mechanism (CDM) projects' by Gustya Indriani, A HWWA-Report – 253
12	The website of the Central Pollution Control Board (CPCB) www.cpcb.nic.in Reference: No 46.0 OIL DRILLING & GAS EXTRACTION INDUSTRY, B - Guideline for Discharge for Gaseous Emissions for elevated/ ground flares
13	Approved Methodology for "Flare reduction and gas utilization at oil and gas processing facilities"

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Enclosure 1

Emission Reduction

Enclosure 1: Emission reduction calculation for Uran Plant

Year	Estimated baseline flaring (sm3)	Avoided CO2 emissions (tons CO2)	Project Emission (ton CO_2)	Emission reductions (10 years) in tCO2
2007-08	44340865	102469.3	4728.8	97740.5
2008-09	44340865	102469.3	4728.8	97740.5
2009-10	44340865	102469.3	4728.8	97740.5
2010-11	44340865	102469.3	4728.8	97740.5
2011-12	44340865	102469.3	4728.8	97740.5
2012-13	44340865	102469.3	4728.8	97740.5
2013-14	44340865	102469.3	4728.8	97740.5
2014-15	44340865	102469.3	4728.8	97740.5
2015-16	44340865	102469.3	4728.8	97740.5
2016-17	44340865	102469.3	4728.8	97740.5
Total				**977405**

Project Emission calculation

		2007 -09	2008-09	2009 -10	2010 - 11	2011 - 12	2012 -13	2013- 14	2014 -15	2015-16	2016-17
		Uran	Uran	Uran	Uran	Uran	Uran	Uran	Uran	Uran	Uran
Estimated Gas Recovered(sm3)		44340865	44340865	44340865	44340865	44340865	44340865	44340865	44340865	44340865	44340865
Project emissions		4728.79	4728.79	4728.79	4728.79	4728.79	4728.79	4728.79	4728.79	4728.79	4728.79
$PE_{CH4,pipeline,y}$ (FEy)	tCO2	93.9078	93.9078	93.9078	93.9078	93.9078	93.9078	93.9078	93.9078	93.9078	93.9078
GWP		21	21	21	21	21	21	21	21	21	21
kg to ton		0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
CH4 emission factor	Gg/year/km	0.0029	0.0029	0.0029	0.0029	0.0029	0.0029	0.0029	0.0029	0.0029	0.0029
Length of pipeline	Km	1.542	1.542	1.542	1.542	1.542	1.542	1.542	1.542	1.542	1.542
$PE_{CH4,accident,y}$	tCO2	0	0	0	0	0	0	0	0	0	0
$PE_{CO2,fossil\ fuel,y}$	tCO2	1880.44	1880.44	1880.44	1880.44	1880.44	1880.44	1880.44	1880.44	1880.44	1880.44
quantity of fossil fuel(NG) consumed per day	SCM	2591.88	2591.88	2591.88	2591.88	2591.88	2591.88	2591.88	2591.88	2591.88	2591.88
quantity of fossil fuel (NG) consumed per year	SCM	946035.56	946035.56	946035.56	946035.56	946035.56	946035.56	946035.56	946035.56	946035.56	946035.56
FCTy	m3/m3	0.0213	0.0213	0.0213	0.0213	0.0213	0.0213	0.0213	0.0213	0.0213	0.0213
Net Calorific value of the fossil fuel (NG)	Kcal/SCM	8436	8436	8436	8436	8436	8436	8436	8436	8436	8436
Total energy content of the fossil fuel (NG) consumed	TJ	33.52	33.52	33.52	33.52	33.52	33.52	33.52	33.52	33.52	33.52
Emission factor of the fossil fuel (NG)	t CO2/TJ	56.1	56.1	56.1	56.1	56.1	56.1	56.1	56.1	56.1	56.1
EFFCTy	t CO2/m3	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020
FFUy (emission due to additional energy consumption at the process plant)	t CO2	2754.44	2754.44	2754.44	2754.44	2754.44	2754.44	2754.44	2754.44	2754.44	2754.44
Qy (fuel consumed by the end use facility)	sm3	44340865	44340865	44340865	44340865	44340865	44340865	44340865	44340865	44340865	44340865
Emission factor	(ton CO2/sm3)	6.21196E-05	6.21196E-05	6.21196E-05	6.21196E-05	6.21196E-05	6.21196E-05	6.21196E-05	6.21196E-05	6.21196E-05	6.21196E-05

Enclosure 2

Communications Between ONGC And Technology Supplier

NICCO CORPORATION LIMITED
PROJECT DIVISION

PKN/SR/C 203/164/05

4th August, 2005

M/s Oil and Natural Gas Corporation Ltd.
Onshore Installation Group
LPG/CSU Plant
Uran-400 702
Fax No 022 27222825

Kind Attn : Mr B R K Verma (DGM-C&M)

Sub : ONGC, Uran – Flare Gas Recovery Project

Dear Sir,

We are in receipt of your letter MRBC/URN/LSG/FGRP/114(3) dated 02/08/05 regarding certain post completion issues under warranty period. We give below our action points :-

1 Our sub-vendors M/s KPCL & Tuzsoo have already taken action for providing Bellow type seal for Lube Oil Pump and presently this pump is lying at V-Trans Transportation godown at Uran for last 3 days. Ph. No. 3099 2605 & LR No. 168032. We have already informed our Mr S Layek who is taking necessary action with M/s KPCL,Pune (Mr Jaina) K Hammady) and M/s Tuzsoo (Mr Vivek Kulkarni). Hope this work can be completed by 9th or 10th August'05 at Uran. We shall be highly obliged if you also keep pressure on M/s KPCL, Pune who is your regular vendor.

2 During the installation of above pump at Uran M/s KPCL and M/s Tuzsoo still check out the spare pump for necessary changes of Bellow type seal at the earliest possible time.

3 We have already requested M/s KPCL,Pune to take immediate action for supply of Bellow type seal.

4 M/s KPCL confirmed that 'O' ring for shaft seal is already received at their Pune factory and shall be delivered in early next week.

5 This gear box of Lube Oil Cooler is a non-standard item as confirmed by M/s Paharpur and they will take time to deliver this item within 15-20 days time. In this regard we have already intimated you through our fax dated 3/8/05. We understand M/s Paharpur is executed lot of big project at ONGC Uran itself, may we request you to have a word that their Sr. Officer at Uran project site to execute this delivery.

However, we shall put one gear oil supplement balance type seal (important lubricant) in that gear box which is developed by our NICCO Engineering Services Ltd. and it may reduced substantial vibration of gear box.

Thanking you,

Yours faithfully,
for NICCO CORPORATION LIMITED

P K Nag
General Manager - Projects

Cc : Mr S Layek, NICCO Bombay –
Please coordinate with M/s KPCL & M/s Tuzsoo on top priority basis.

"Please use e-mail through Lotus Notes (cnjc.co.in) for official communication"

Registered Office : NICCO HOUSE • 2 Hare Street • 3rd floor • Kolkata-700 001
Telephone : 2210 5313/14; 2242 3245/46 (DISA); 2242 3534 (Board) • Fax : (91) 33-2248 3098; 2230 2362; 2231 4244
E-mail : nicco@vsnl.com • Web Site : www.niccoproject.com

ऑयल एण्ड नेचुरल गैस कॉरपोरेशन लिमिटेड
मुम्बई क्षेत्र, उरण प्लांट, उरण

OIL AND NATURAL GAS CORPORATION LIMITED
MUMBAI REGION, URAN PLANT, URAN
DIST- RAIGAD, MAHARASHTRA - 400702

Engineering Services Group

No. MRBC/URN/ESG/FGRP/114(3)

Date: 04.05.2005

M/s NICCO Corporation Limited
Project Division
2, Hare Street, Kolkata
Fax No. 033 22483098

MR. P K NAG; GM (PROJECTS)

Ref: Flare Gas Recovery Project

Dear Sir,

Please refer our discussion on phone today regarding leakage of oil from bearing housing and fabricated flange of seal stationery part. "O" ring of the stationery flange was replaced by M/s Tussaco Pumps but still the leakage of oil is there from lube oil pump.

You are requested to modify the seal and bearing housing in such a way that there should not be any leakage of oil.

MATTER MOST URGENT.

Thanking you,

Yours faithfully,

04/05/05

(L. K Jindal)
CE (E)

Copy to:-

1.GM-HES/DGM(C&M)
2.Shri. M.P.Behere; GM (AC&R), M/s Kirloskar Pneumatic Co. Ltd
Hadapsar Industrial Estate, Pune Fax No. 020 2687 0514 / 0297

NICCO CORPORATION LIMITED
PROJECT DIVISION

FASCIMMILE TRANSMISSION

SL / KM / C203 / 03 / 22 — December 17, 2003

M/s Kirloskar Pneumatic Co. Ltd.
Hadapsar Industrial Estate
Pune – 411013

Kind Attn. : Mr. D. S. LOKRAS – DGM (ACR)

Subject : FLARE GAS RECOVERY COMPRESSOR (HOWDEN – UK make)

Ref : ONGC, Flare Gas Recovery Project

Dear Sir,

Flare Gas Recovery Compressor is under shutdown since last Saturday (13-12-2003) and the status was immediately conveyed to you over the telephone by ONGC and NICCO. Your representative(s) from Pune have visited ONGC Uran plant on 15-12-2003 & 16-12-2003 to detect the actual problem. Apparently it has been detected with the help of ONGC's Instrumentation engineers and telephonic guidance given by Bentley Nevada's representative that axial displacement sensing probe for rotor displacement is got damaged somehow and since the probe is placed inside the compressor it wouldn't be rectified from outside. As informed by your representative that it may require to open the compressor for its rectification. In this regard please note that ONGC is very much stringent regarding opening of the compressor since the entire compressor was brought in assembled conditions from HOWDEN-UK. So you are requested to ensure the followings before opening the compressor casing or dish end at site:

1. Bentley Nevada concerned representative has to come along with you at Uran site by 18-12-2003 to re-check & re-ensure the damage in presence of ONGC. Accordingly you have to line up with HOWDEN for its rectification immediately since Christmas is not far away.

2. HOWDEN concerned representative has to come for technical assistance in association with Bentley Nevada person before opening the compressor. Please note that ONGC is very much serious to get proper diagnosis why the probe got damaged , whether any other component(s) inside the compressor got damaged or

Registered Office : NICCO HOUSE ● 2 Hare Street ● 3rd floor ● Kolkata-700 001
Telephone : 210 5313/14; 242 3245/46 (DISA); 242 3334 (Board) ● Fax : (91) 33-248 3099; 220 2382; 221 4244
E-mail : nicco@vsnl.com ● Web Site : www.niccoprojects.com

ALL REPLIES TO BE ADDRESSED TO THE PROJECT DIVISION

not, it has also to be ensured that the similar defect should not appear in near future for long, safe and steady operation of compressor package.

3. Prior to visit of HOWDEN representative at ONGC Uran plant for rectification the compressor problem, an ACTION PLAN (in micro detail) has to be prepared after consulting HOWDEN (written)and BENTLEY NEVADA to ensure the availability of all sorts of parts / components, tools & tackles, consumables, machinery etc. at site before opening the compressor.

Being the Flare Gas Recovery Project is very prestigious in nature and being executed for the First Time in INDIA, ONGC's C&MD had formally inaugurate the project and conveyed his hearty congratulations to all concerned for its successful running and the status of the project is also being monitored by him. So you are once again requested to take corrective measures for its rectification immediately so that the plant gets back its normal operation.

Yours truly,
For **NICCO CORPORATION LTD.**

17/12/03

S LAYEK
Site in Charge

cc Mr. S. K. TIKKU – DGM (MARKETING) – KPCL – MUMBAI : Request to expedite

cc Mr. A. M. KHAN – GM (HES) ; ONGC – Uran Plant
cc Mr. R. K. MIGLANI – DGM (P) E&P ; ONGC – Uran Plant
cc Mr. B. R. K. VARMA – DGM (C&M) ; ONGC – Uran Plant
cc Mr. T. K. KRISNAMURTHY – DGM (OPERATION) ; ONGC – Uran Plant

cc Mr. P. K. NAG – GM (PROJECTS) – NICCO, KOLKATA : Request to expedite

making tomorrow brighter

OIL AND NATURAL GAS CORPORATION LTD.
ENGG. SERVICES GROUP, LPG/CSU PLANTS, MR, URAN-400 702
TELEPHONE: 022-27222308, 27222816/20, FAX: 022-27222825/811

No. MRBC/URN/ESG/FGRP/114(3) Date : 01.03.2005

M/s Paharpur Cooling Tower Ltd.
Paharpur House
8/1/B, Diamond Harbour Road
Kolkata – 700 027
Fax No. 033 - 2479 2188

Attn.: Mr. S. K. BHARGAWA, Vice President.
SUB: Flare Gas Recovery Project

Dear Sir,

This is in reference to my earlier letter of even no. dated 18th February, 2005 regarding the high vibrations of the Oil and Gas cooler fans installed in Flare Gas Recovery Project, Uran..

In this connection, it is informed that even after the replacement of the couplings and realignment of the motor & Gear Box by your representatives, the vibration level of the cooler fans is very high accompanied by abnormal sound. Besides, during the aforesaid rectifications, it was observed by your representatives that the Pitch angle of the Fan blades had been disturbed during operations, which was adjusted by them.

In view of the above, there seems to be no alternative now except to undertake the structural modifications in order to reduce the high vibrations, as proposed by your representative Shri G. Biswas earlier.

Therefore you are requested to submit the details of structural modifications, duly ratified by your Design department along with the design calculations, to M/s. NICCO for review.

Action in this regard to be taken up on priority to avoid shut down of compressor, due to failure of after cooler.

Thanking you,

Yours faithfully,

1/3/05

B R K VARMA
DGM (C& M)

Copy to : Mr. P K NAG, GM (PROJECTS) M/s. NICCO Corporation Limited, Project Division, 2, Hare Street, Kolkata – to get the structural modifications carried out.
CC: Mr. VIKRAM SWAROOP, M.D., M/s Paharpur Cooling Tower Ltd.
N.O.O. Copy for kind information to:-
01. GGM – HUP
02. GM – HES
03. GM - OM

1/3/05

Received one copy of Prog. on behalf of M/s 01/03/05 Nicco

making tomorrow brighter
ONGC

OIL AND NATURAL GAS CORPORATION LTD.
ENGG SERVICES GROUP, LPG/CSU PLANTS, MR, URAN-4u0 702
TELEPHONE : 022-27222308, 27222816/20, FAX: 022-27222825/811

No. MRBC/URN/ESG/FGRP/114(3) Date: 20.01.2005

M/s Kirloskar Pneumatic Co. Ltd
AC&R
Hadapsar Industrial Estate, Pune
Fax No. 020 2687 0514 / 0297
Attn.: Mr. B.M.BEHARE, G.M. (AC&R)

SUB: Flare Gas Recovery Project-Repair

Dear Sir,

This is regarding the recurring seal failure of 'TUSHACO' make oil pump installed on our Flare Gas Recovery Project at URAN plant, URAN, through M/s. NICCO Corp.

As informed vide your letter nos. ACR/PRJ/9165/2004-2006 dt. 24.07.2004 and 09.08.2004, the cause of seal failure was attributed to high vibrations on account of the NRV in the suction line being kept open, resulting in insufficient NPSH for the pumps.

As advised in your aforesaid communications, the NRV has been checked, serviced and steps have also been taken to ensure that the same remains in line throughout, whether the compressor is ON or OFF.

However on restarting the compressor after complying with all your advisories, to our utter disbelief, the seal started leaking again. This despite the fact that it was earlier attended to by the Pump and Seal OEMs' representatives along with your Engineers.

Such recurring failure of a similar nature, obviously indicates that the trouble shooting source has not been identified perfectly and attended. This has caused heavy loss to ONGC in the form of leakage and heavy loss of oil. The loss of oil due to seal leakage and failure shall have to be replaced by M/s. KPCL or equivalent amount shall be recovered from the M/s NICCO's balance payments.

Therefore, urgent measures may please be taken to logically analyse the failure and rectify the same on **WHITE HOT PRIORITY** to avoid any further losses to ONGC.

Thanking you,

Yours faithfully,

20/1/05

B R K VARMA
DGM (C& M)

Copy to :

01. Mr. Aditya Kaowshik, Vice President, M/s. KPCL.
02. MR. P K NAG; GM (PROJECTS) M/s. NICCO Corporation Limited, Project Division, 2, Hare Street, Kolkata – to follow up with M/s. KPCL.

OIL AND NATURAL GAS CORP. LTD

MUMBAI REGION

ENGINEERING SERVICES GROUP, LPG/CSU PLANTS, URAN - 400 702

TELEPHONE: 022 - 27222308,27222816/20, FAX : 022 –27222825/811

No. MRBC/URN/ESG/FGRP/114(3)

Date : 14-06-2004

M/s Kirloskar Pneumatic Co. Ltd.
AC&R
Hadapsar Industrial Estate
Pune
Fax No. 020 2687 0514

RPT

M/s NICCO Corporation Limited
Project Division
2, Hare Street
Kolkata – 700 001
Fax No. 033 224803098

Attn. : Mr. D S LOKRAS; DGM (AC&R) / Mr. P K NAG; GM (PRJECTS)

Ref. Lube Oil Pumps - Flare Gas Recovery Compressor at Uran Plant

Dear Sirs,

This has reference to your confirmation and subsequent long awaited visit of M/s Tushaco Pump & Leak Proof representatives at our Uran Plant on 07-06-2004 to attend the mechanical seal leakages of lube oil pumps PA-71-1201A & PA-71-1201B. They had attended the pump PA-71-1201B. But unfortunately after putting on operation the pump again started leaking. Apart from the above the other pump PA-71-1201 A is yet to be attended, in fact, the above representatives of M/s Tushaco Pump & Leak Proof had confirmed their next visit on 14-06-2004 at our plant premises along with all necessary spares to attend the mechanical seal leakage of the other pump PA-71-1201 A but they have not reported today.

Request please arrange to depute reliable representatives of concerned vendors along with all sorts of necessary spare parts immediately to attend the mechanical seal leakage problem of the pumps PA-71-1201 A & PA-71-1201 B as we are loosing such a costly imported synthetic oil continuously.

You are once again requested to put your concern for proper rectification of mechanical seal leakage of the above lube oil pumps as we are facing this problem since long.

Thanking You,

Yours faithfully,

14/6/04

L K JINDAL
Chief Engineer (Electrical)

OIL AND NATURAL GAS CORP. LTD

MUMBAI REGION

ENGINEERING SERVICES GROUP, UPG/CSU PLANTS, URAN - 400 702

TELEPHONE: 022 - 27222308,27222816/20, FAX : 022 –27222825/811

Facsimile Transmission

No. MRBC/URN/ESG/FGRP/114(3) Date : 08-06-2004

PAHARPUR COOLING TOWERS LTD.
Paharpur House
8/1/B, Diamond Harbour Road
Kolkata – 700 027

Attn : MR. S K BHARGAVA ; GM (CONST.) /
MR. M K DASGUPTA ; SR. MANAGER (TECH)
FAX NO: 033 2479 2188

Ref. Fin Fan Coolers for Flare Gas Recovery Project

Dear sir,

This has reference to visit of your Mr. G Biswas along with Cofimco & Emadi International representatives at our Uran Plant on 07-06-2004 for replacement of damaged lube oil cooler fan by Cofimco make fan. In presence of our operation & maintenance group, installation and various parameters of all the four coolers have been checked & observations are recorded as below:

I. **Vibration Limit Switch:** All the four vibration limit switches have been found non-functioning and your Mr. G Biswas has also agreed on that after necessary inspection. Either the vibration switches are not getting re-set or these are at all not getting actuated for tripping the cooler fan on vibration at tripping level. Even your representative have to start the gas cooler 71-E-1201B by by-passing the vibration limit switch of that fan unit. You are requested to immediately replace all the four non-functioning vibration limit switches for safe operation of cooler units.

II. **Fan Blade Angle:** Fan Blade Angle for lube oil coolers were initially set at around 20° by you during commissioning but Cofimco has confirmed that the angle should be 10.6° only and accordingly new blades are installed at this specified angle. And for gas after coolers blades were initially set at around 12° by you during

commissioning but Cofimco has again confirmed that the angle should be 5.6° only and accordingly blades are re-installed. Please note that Cofimco representative along with Emandi International have doubted that the wrong fixing of fan blade angle would have affected the performance of the cooler fans blades. However detail study will be done by their engineering section and report will be submitted accordingly. It is also observed that the current consumption is reduced from 20 Amps to 16 Amps for gas after cooler and from 14 Amps to 11 Amps for lube oil cooler.

III. **Vibration**: After insallation of new Cofimco make fans on lube oil coolers and re-installation of gas after cooler fan blades at desired angle, vibration at various points on motor & gear reducers are measured and recorded jointly. Most of the readings have been recorded slightly in the higher side and few radial reading on gear reducers have been recorded at alarming level and these readings are as under: 13.3 mm/sec for oil cooler 1202A, 11.3 mm/sec for oil cooler 1202B, 15.95 mm/sec for gas after cooler 1201A. Our Operation & Maintenance Deptt. are strongly doubting the performance of gear reducers of the above cooler units.

Our operation & maintenance deptt. are still facing great difficulties to check the oil level at gear reducer when the cooler unit in under operation so you are once again requested to provide some external arrangement on gear reducers so that the oil level can be checked from out side.

Trust you will do the needful immediately for trouble free long term performance of fin fan coolers.

Thanking you,

Yours faithfully,

09/06/04

L K JINDAL
CHIEF ENGINEER (E)

Copy to : MR. P K NAG ; GM (PROJECTS) ; NICCO – KOLKATA

OIL AND NATURAL GAS CORPORATION LIMITED

MUMBAI REGION

URAN PLANT, URAN

Gas Processing Group
C2-C3 Building, Uran Project.

Inter Office Memo

File No. : MR/URAN/02-047/F4C6/03-04
Date : 10.03.2004

From: T.Krishnamoorthy DGM-AM (Gas Processing)

To: Shr. B.R.K. Verma, DGM(C&M), OIG

Subject: Flare gas recovery compressor- Thrust bearing temperature high.

Flare gas recovery compressor, 70-K-1201, is frequently tripping on thrust bearing (Male active) temperature high when running on higher load. Normal temperature is 75 to 80 0C. Its pre-alarm is on 95 0C & trip valve is 105 0C. All other bearing temperatures are normal. The lube oil temperature & pressure is being maintained as per operating manual.

It was also observed that axial displacement, which was recently attended, is going on higher side and pre-alarm is actuating sometimes.

It is requested to call the representative of vender to attend the above problems.

11/3
DGM-AM (Gas Processing)

CC:

Phone : 91-22-723 2626 & 7222616-20, Extn.: 4011/ 4007/ 4012/ 4013 Fax : 91-22-7222611
e-mail : [illegible]

[illegible]

Shr. B.R. Varma

11/3/04
B. R. K. VARMA
Dy. Gen. Manager (C & M)
(Resident Construction Manager)
ONGC, LPG Cr. Plant, URAN,
Pin Code - 400 702.

ओएनजीसी

ONGC

ऑयल एण्ड नैचुरल गैस कारपोरेशन लि.

OIL AND NATURAL GAS CORPORATION LTD.

MUMBAI REGINAL BUSINESS CENTRE
OPERATION BUSINESS GROUP, URAN.

No.MRBC/URAN/ESG/FGRP-114 (4)/04
File No.......................

Date: 13/02/04
Noting Page No.......................

Sub: Security Clearance

Mr. MARK FAIRBAIRN ,U.K. of M/s. HOWDEN COMPRESSOR, will be visiting ONGC Uran Plant, Uran from 16/02/2004 for a period of one week in connection with the replacement of male rotor axial displacement probe for Flare Gas Recovery Project at Uran.

Passport details of the Foreigner are given below and the advance information format is placed in the file along with a copy of the Passport.

1. Name: Mr. MARK FAIRBAIRN
2. Date of Birth: Jan 15, 1962
3. Nationality: BRITISH CITIZEN
4. Passport No: 400678137
5. Validity of Passport : Feb 27, 2013

Security Clearance may please be given for the above Foreigner for making his Entry pass to visit inside the plant premises of ONGC, Uran.

[signature] 13-02-04
T. Mohan Prasad
SE (P)

DGM (C&M) [signature] 13/2/04

DGM (P)-ESP [signature] 13/2/04

GM-HES [signature] 13/2/04

GGM-HUP view of conference in Mumbai may be obtained from HUP later.

I/c security Pl permit
I/c CISF

[signature] 13/2/04

Jairaj K. Hemmady (ACR [illegible] Extn.- 4100)

From: Jairaj K. Hemmady (ACR Proj, Extn.- 4100)
Sent: Saturday, March 13, 2004 4:46 PM
To: 'TKPrasad@ongc.net'
Cc: 'nicco_ongc@vsnl.net'; Kavathekar K. A. (ACR Division); Behere M.P. (GM - ACR Proj); 'pkm@niccoproj.com'; 'Gautam.Karnik@siemens.com'
Subject: FLARE GAS RECOVERY PROJECT - VISIT OF SIEMENS ENGINEER FOR PLC SOFTWARE TRAINING

Attn. Mr. B. R. K. Varma / Mr. Mohan Prasad,

Please refer to your letter MP/URN/FSG/FGRP/114(4) dt. 26/02/04 regarding the deputation of Siemens trainer for training of your instrumentation operational personal on usage/configuration of PLC software.

We confirm that our Instrumentation Engineer Mr. K. A. Kavathekar will be visiting your plant along with Siemens Engineers Mr. Kamat & Mr. Dipesh Haldar on 17/03/04 & 18/03/04 for two days for imparting the training to your instrumentation operational personal on usage/configuration of PLC software. You are requested to inform all the concerned persons to attend the training.

You are also requested to arrange the gatepass for above three persons on 17/03/04 & 18/03/04 for two days.

Regards,

Jairaj. K. Hemmady

Kirloskar Pneumatic Co. Ltd.
Hadapsar Industrial Estate
Hadapsar
Pune-411013
Ph:020-26870133,26870341
Fax:020-26870514,26870341

16/3

Ref. M. Prasad

16/3 (H)

Enclosure 3

TABLE 34 : PRODUCTION AND IMPORTS OF CRUDE OIL AND PETROLEUM PRODUCTS

TABLE 34 : PRODUCTION AND IMPORTS OF CRUDE OIL AND PETROLEUM PRODUCTS

(Million tonnes)

Year	Production		Imports	
	Crude oil	POL products	Crude oil	POL products
1	2	3	4	5
1972-73	7	19	13	3
1973-74	7	19	14	3
1974-75	8	20	14	2
1975-76	9	21	14	2
1976-77	10	23	15	3
1977-78	11	24	15	4
1978-79	13	26	15	4
1979-80	9	24	16	7
1980-81	11	24	16	6
1981-82	20	30	17	5
1982-83	25	32	16	4
1983-84	28	33	15	6
1984-85	30	39	15	4
1985-86	31	42	14	3
1986-87	30	45	18	4
1987-88	32	45	18	6
1988-89	34	49	19	6
1989-90	33	48	21	7
1990-91	33	49	22	10
1991-92	28	51	30	10
1992-93	27	50	30	12
1993-94	27	51	31	12
1994-95	32	53	27	14
1995-96	35	55	27	20
1996-97	33	59	34	20
1997-98	34	61	34	23
1998-99	33	65	40	24
1999-00	32	79	58	17
2000-01	32	96	74	9
2001-02	32	100	79	7
2002-03	33	104	82	7
2003-04	33	113	90	8
2004-05	34	118	96	9
2005-06P	32	120	99	12

P : Provisional. POL Petroleum, oil and lubricants.

Source : Ministry of Petroleum and Natural Gas, Government of India.

Enclosure 4

Certificate of Recognition

NATIONAL PETROLEUM MANAGEMENT PROGRAMME

AWARDS FOR EXCELLENCE

Certificate of Recognition

Creativity & Innovation
For the Year 2003-2004

Team Category - (Non R&D)

A Certificate of Recognition for Creativity & Innovation in the Non-R&D Team Category goes to **Shri B.R.K. Verma,** DGM (C&M) and his team comprising **Shri T. Krishnamoorthy,** DGM (P), **Shri R. Kher,** CE (P), **Shri L.K. Jindal,** CE (E), **Shri A.G. Dahake,** SE (P), **Shri S.K. Biswas,** SE (INST), **Shri T. Mohan Prasad,** SE (P), **Shri Prabhat Kumar,** SE (P), **Shri A. Hosatti,** EE (P) **and Shri C.M. Virkud,** AEE (E) from **Oil and Natural Gas Corporation Limited for Zero Hydro carbon Emission at Uran.**

Hydro carbon emissions cause tremendous environmental problems at national and international level, in addition to the economic loss of the gas which is flared. The team has successfully implemented innovations to achieve zero hydro carbon emission level besides additional production of value added LPG, naptha and C2C3. The pay back period for the investment is about three to three and a half years. ONGC has found the use of Flare Gas Recovery Unit (zero flaring) and Tank Vapour Recovery Unit to be extremely economical and efficient and are trying to replicate this in other projects as well. This is the first time such an achievement has been made in any of the plants and the overall impact of these innovations would be enormous not only in economic but also in environmental terms.

In commendation of this work Certificate of Recognition is given to **Shri B.R.K. Verma** and his team from **ONGC.**

(S.C. TRIPATHI)
Secretary
Ministry of Petroleum & Natural Gas
&
Chairman General Council