Tambun LPG Associated Gas Recovery and Utilization Project

Clean Development Mechanism (CDM)

CER Monitoring Report

(Certified) Emission Reductions

Monitoring Period: 01 October 2010 – 28 Feb 2011 (inclusive of both days)
CDM Registration No: 1144

Date: 24 June 2011
Version 01

A project designed to meet the baseline and monitoring requirements of UN CDM Approved Methodology

AM0009 Version 2
"Recovery and Utilization of Gas from Oil Wells that would otherwise be flared"

MONITORING REPORT FORM (CDM-MR)*
Version 01 - in effect as of: 28/09/2010

CONTENTS

* as contained within the document entitled "Guidelines for completing the monitoring report form (CDM-MR)" (EB 54 meeting report, annex 34).

MONITORING REPORT
Version 01– 24/06/2011

Tambun LPG Associated Gas Recovery and Utilization Project
Reference Number 1144
Eleventh (11th) Monitoring Period: 01/10/2010 – 28/02/2011 (inclusive of both days)

SECTION A. General description of the project activity

A.1. Brief description of the project activity: >>

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The purpose of the project activity is to reduce the greenhouse gas emissions by the recovery and utilization of gases produced as a by-product of oil production activities at the Tambun Fields. The project activity is the construction of the processing and transport infrastructure to take gas that would otherwise have been flared to the Cirebon to Cilegon pipeline.

The technology consists of a mini LPG extraction plant; condensate removal facilities and a 35 km 8" diameter steel pipeline, with associated compressors, metering stations and safety valves. The processing plant and pipeline were constructed in full compliance with environmental regulations and was subject to environmental appraisals as per Indonesian environmental regulations.

Tambun plant started its operation on 27 December 2006. This project was registered as a UNFCCC CDM Project (Reference No. 1144) on 1 February 2008 (http://cdm.unfccc.int/Projects/DB/LRQA%20Ltd1180000727.07/view) and subsequent Project Activity changes were validated and approved by the UNFCCC at EB54 on 28th May 2010.

This Monitoring Report 11 covers the monitoring period of 1 October 2010 – 28 February 2011(inclusive of both days).
The total emission reductions achieved in this monitoring period is **222,119** tCO_2e.

A.2. Project Participants

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PT. Odira Energy Persada, an Indonesian private gas company which was established under the laws of Indonesia and having its registered office at Jl. Patal Senayan No.38, Jakarta 12210, Indonesia (hereinafter referred to as "Odira").

Sindicatum Carbon Capital Ltd, a company incorporated under the laws of England and having its registered office at 33 Duke Street, London, W1U 1JY, United Kingdom (hereinafter referred to as "SCC"). Sindicatum Carbon Capital Ltd has approval from the UK's Designated National Authority and the Designated National Authority of Switzerland.
http://cdm.unfccc.int/Projects/DB/LRQA%20Ltd1180000727.07/view

A.3. Location of the project activity:

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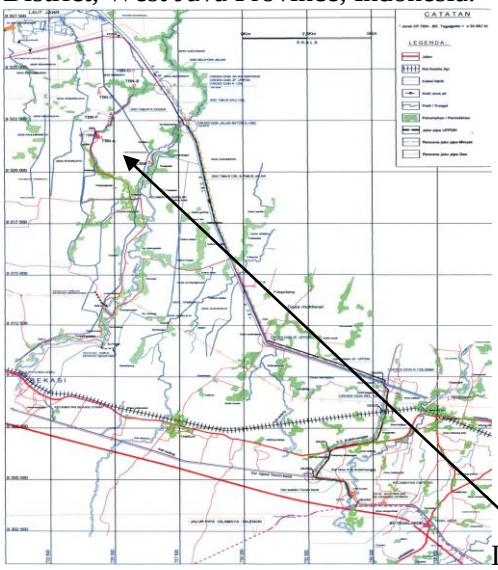
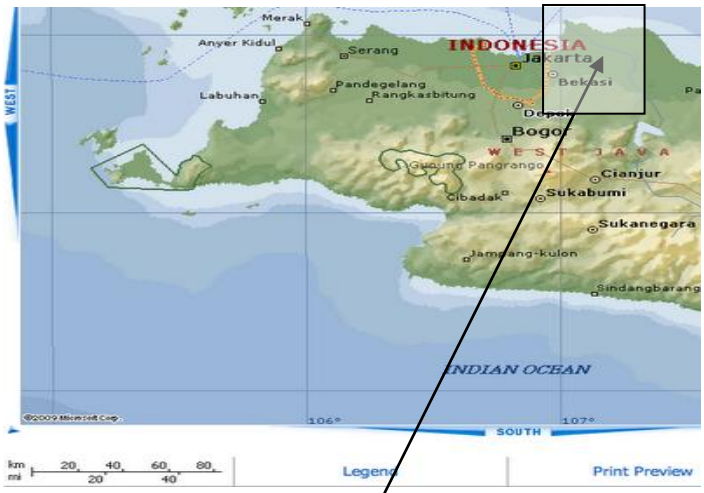
The LPG plant is located at 107º 01’ 40” E, 06º 07’ 55”. It is about 40 km west of Jakarta in Bekasi District, West Java Province, Indonesia.





LPG Plant Location Tambun site

A.4. Technical description of the project

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The Tambun Oil Field is located about 40 km west of Jakarta in West Java Province. This field started production in 2003 at 4,000 barrels per day and had reached up to 8000 barrels per day in 2006. Initially the associated gas was flared. The project activity receives and processes the associated gas supplied from Tambun. A geographical overview of the project location is provided overleaf.

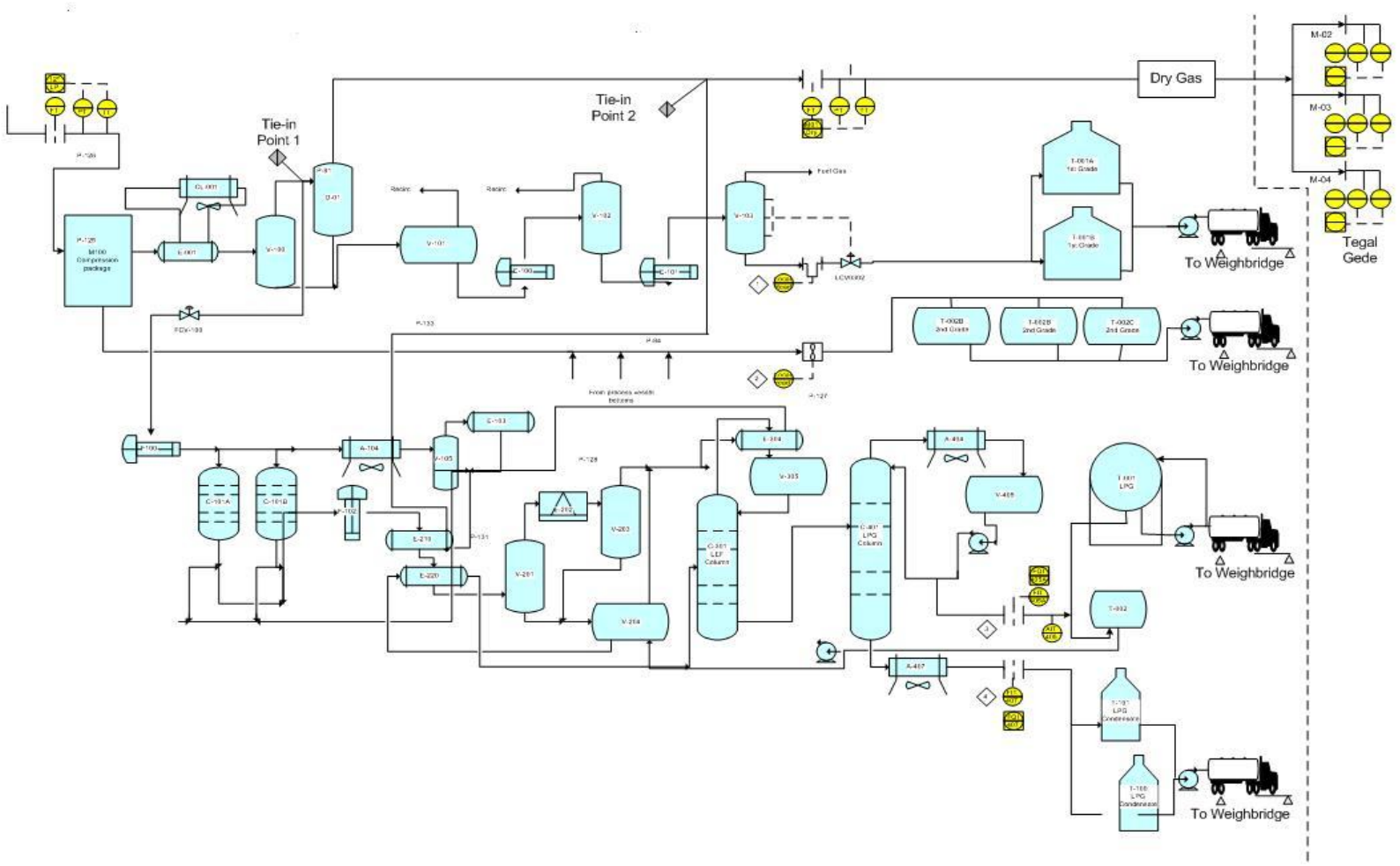
The technology consists of a mini Liquefied Petroleum Gas (LPG) plant with a designed input capacity of 15 mmscfd, condensate removal facilities, a 35 km 8” diameter steel pipeline and associated auxiliary equipment including compressors, metering stations and safety valves. The plant processes associated gas that is normally being flared from the neighbouring Pertamina company. The associated gas is being processed through a series of compressors, chillers and separators to remove the heavier condensate fractions, before being transferred to the mini LPG extraction plant. This mini LPG extraction unit strips out the LPG fraction and leaving the leaner gas and lighter condensate products.

The processing plant and pipeline is constructed in full compliance with the local environmental regulations and was subject to environmental appraisals as per Indonesian environmental regulations. The processing plant is powered by the gas supply, with back-up diesel for generators and fire pumps. The supply pipeline runs 35 km to the main east -west supply line. The pipeline is constructed from carbon steel, with a mid-wall diameter of 8 inches.

Emergency shutdown valves are located at the start and finish of the pipeline and two line break control valves (LBCV) installed at approximately 12km and 24km from the start.

The location of measurement devices installed is presented in figure 2 below:

Figure 2 Location of the measurement devices



Remark:
No gas has been provided through the 4" pipeline from 18th Oct 2008 onward.
At the site one weighbridge is installed.

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

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Title : Tambun LPG Associated Gas Recovery & Utilization Project

Methodology : Recovery and Utilization of Gas From Oil Wells That Would Otherwise Be Flared (**AM0009 version 02**)

For detail information regarding the methodology and tools, further reference is available at UNFCCC methodology website
http://cdm.unfccc.int/methodologies/DB/42X5O8TG3PI07L6WX4YVQNV4ZB12X9/view.html

A.6. Registration date of the project activity:

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Registration Date: 01 Feb 2008.

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

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Crediting Period: 01 Feb 2008 – 31 Jan 2018 (fixed)

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

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Mr. Gareth Phillips
Chief Climate Change Officer
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SECTION B. Implementation of the project activity

B.1. Implementation status of the project activity

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Tambun Plant started operation on 27th December 2006 and the project activity was registered on 1 February 2008. The project activity has been implemented in accordance to registered PDD version 4.3, which is the revision of the previous PDD version 3.12. The PDD version 4.3 was approved at the EB 54 on the 28 May 2010, following the Validation on changes in PDD which was conducted by TUV Nord.

This Monitoring Report 11 covers the monitoring period of 1 October 2010 – 28 February 2011 (inclusive of both days). During this period the plant has been processing on average 19 mmscf per day of associated gas to produce on average 66 tpd of LPG. The total emission reductions achieved in this monitoring period is 222,119 tCO_2e.

Within the period 04/10/2010 at 09:30h till 22/02/2011at 00:00h period, the metering system M-01 described within the registred PDD for determination of the quantity of dry gas produced in the gas processing plant ($V_{B,drygas}$) broke down. During this period similar, alternative calibrated flow meters, located at the Tegal Gede metering station (within same pipeline) were used as replacement for quantifying the dry gas produced and delivered to the pipeline. The dry gas production was measured using 3 flow meters; M-02, M-03 and M-04, located on the downstream of the M-01 meter. The M-02, M-03 and M-04 meters are also used as transactional meters, and hence they are also calibrated annually and maintained regularly. However, since these meters are located outside the project boundary, a request for deviation is to processed for this monitoring period.

The gas inlet flow computer registration was down and during these times the recording from Barton Chart was used. All continuous flow meters recording input of associated gas are in addition to computer registration equipped with continuous Barton chart recorders. On 27 – 28 November 2010 and 8-15 January 2011 the flow computer printer was out.

B.2. Revision of the monitoring plan

As described above the monitoring plan for the project activity has been revised and approved by the UNFCCC on 8 June 2009. The revised monitoring plan is available at http://cdm.unfccc.int/Projects/DB/LRQA%20Ltd1180000727.07/view

B.3. Request for deviation applied to this monitoring period

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A request for deviation is to be processed for this period for the use of the alternative continuous dry gas flow meters M-02, M-03 and M-04 instead of the broken M-01 flow meter.

B.4. Notification or request of approval of changes

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The initially registered PDD has been revised following the procedures for notifying and requesting approval of changes from the project activity as described in the registered PDD (version 3.12) (Annex 66, at meeting EB48) and the guidelines on assessment of different types of changes from the project

activity as described in the registered PDD (annex 67,EB 48.).The revised PDD (PDD version 4.3) is available at
http://cdm.unfccc.int/Projects/DB/LRQA%20Ltd1180000727.07/view.

The project activity change has been approved at EB54 on 28th May 2010. The validation of project activity changes was carried out by TUV Nord and the report is available at
http://cdm.unfccc.int/Projects/DB/LRQA%20Ltd1180000727.07/view

SECTION C. Description of the monitoring system

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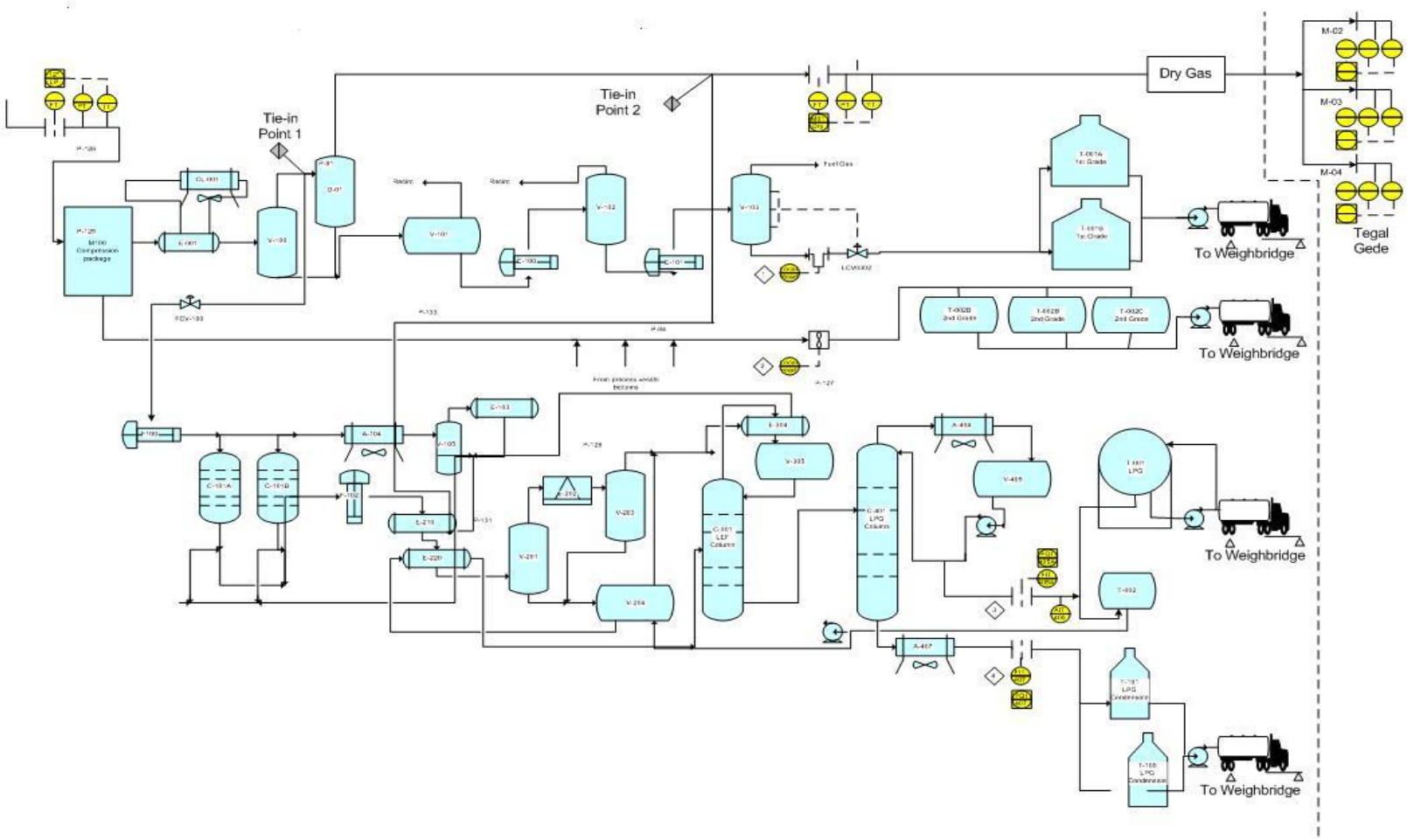
C.1. Parameters Monitored

The parameters monitored and the monitoring procedure applied for determination of the emission reductions is described in section B.7.1 and more specific in section B.7.2 of the Project Design Document v4.3 dated 6 November 2009, and available upon the UNFCCC website (http://cdm.unfccc.int/Projects/DB/LRQA%20Ltd1180000727.07/view

The location of measurement devices installed is presented in figure 2 below:

The monitoring is carried out according the accepted revised monitoring plan in the Project Design Document v4.3. The PDD is validated by TUV Nord. The validation of project activity changes was carried out by TUV Nord and the report is available at
http://cdm.unfccc.int/Projects/DB/LRQA%20Ltd1180000727.07/view

Figure 2 Location of the measurement devices



Remark:
No gas has been provided through the 4" pipeline from 18th Oct 2008 onward
At the site one weighbridge is installed.

C.2. Quality Assurance/ Quality Control

In order to guarantee the quality of the data and data collection system, a detailed monitoring manual has been developed and implemented. This quality manual or monitoring plan (available for verification by a designated operational entity (DOE)) is based upon the requirements set in the registered PDD and addresses as a minimum the items listed below.

All data is compared from month to month using trend analysis to show where parameters have deviated significantly from preceding values. Any values identified as being unusual in this manner are re-checked and corrected if necessary, following the procedures in the monitoring manual.

Fugitive emissions of methane from the processing plant and pipelines and from accidental releases of methane from the transmission pipelines are calculated using the EPA approach[1] as per AM0009v2.

Any significant differences between daily / weekly / monthly or periodic values will be reviewed. An overview of the data collection process is provided in table 1 underneath. Detailed formulas for the calculation of emissions are presented in Section 3 below.

Table 1. Data collection process

Parameter	Reference	Procedure / Frequency	Registration	Check and correct primary measurements
Baseline Emissions	The baseline emissions are calculated using the formulae described in the PDD, section B6.1 - using the CDM spreadsheet	Primary data (weekly reports) are entered by the SCC officer in the CDM spreadsheet at the start of each month	CDM spreadsheet stored at SCC Project File S-Server	The SCC project officer performs a consistency check based upon previous months. In case of irregularities data is double checked with Odira and if needed corrected
Leakage	Leakage is calculated using the formulae described in the PDD, section B6.1 - using the CDM spreadsheet	Primary data (weekly reports) are entered by the SCC officer in the CDM spreadsheet at the start of each month	CDM spreadsheet stored at SCC Project File S-Server	The SCC project officer performs a consistency check based upon previous months. In case of irregularities data is double checked with Odira and if needed corrected

[1] Document EPA-453/R-95-017 available at http://www.epa.gov/ttnchie1/publications.html.

Project Emissions	The project emissions are calculated using the formulae described in the PDD, section B6.1 - using the CDM spreadsheet	Primary data (weekly reports) are entered by the SCC officer in the CDM spreadsheet at the start of each month	CER spreadsheet stored at SCC Project File S-Server	The SCC project officer performs a consistency check based upon previous months. In case of irregularities data is double checked with Odira and if needed corrected
Emissions Reductions	The emission reductions are calculated using the formulae described in the PDD, section B6.1 - using the CDM spreadsheet	Primary data (weekly reports) are entered by the SCC officer in the CDM spreadsheet at start of each month	CER spreadsheet stored at SCC Project File S-Server	The SCC project officer performs a consistency check based upon previous months. In case of irregularities data is double checked with Odira and if needed corrected

Accuracy and calibration of instruments

All measurement devices are maintained to ensure a high level of accuracy. All meters are subject to a quality control regime that includes a regular maintenance and calibration according to manufacturer's instructions.
A record is available showing the location and unique identification number of each meter, the calibration status of that meter (when last calibrated, when next due for calibration).
Annual calibrations of continuous flow meters and weighbridge are performed (as locally required) by the Indonesian 'Directorat Metrologi' (State organization). All calibration records are retained for until two years after the end of the crediting period and are available for verification by the DOE. Additional instrument verification, flow calculation and maintenance/configuration checks are carried out periodically by SCC staff.

Uncertainties for each flow metering point are calculated using EN ISO5167-1:2003 Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full General principles and requirements -Publication date 18 March 2003.
Uncertainties in batch measurement and analysis are in accordance with BS ISO5168:2005: Measurement of fluid flow. Procedures for the evaluation of uncertainties - publication date 10 August 2005. A copy of the uncertainty calculation is available for the verifying DOE.

Archiving of data

Data is archived periodically to a secure and retrievable storage format for a period 2 years after crediting period (see also Annex A).

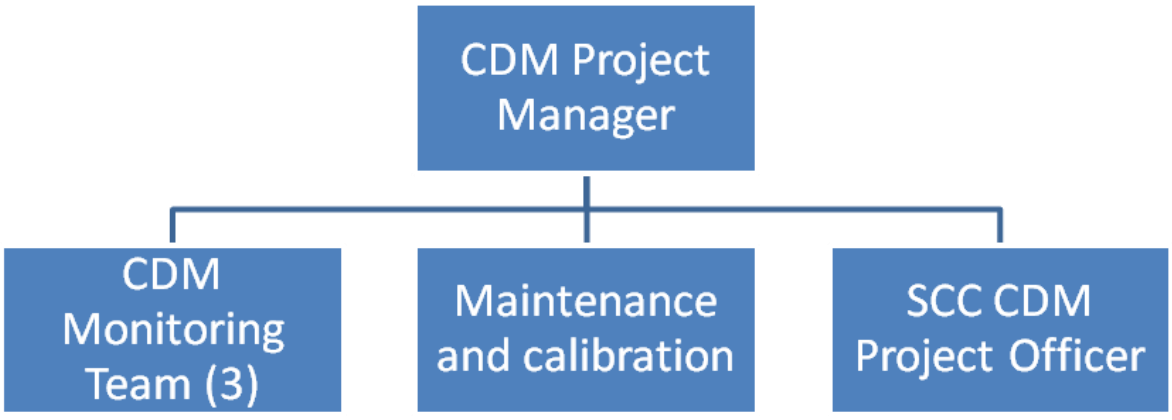
Document Control

A document control system has been introduced ensuring that the current versions of necessary documents are available at the point of use. An overview of type of data, location and storage means is provided in the table included in Annex A.

Treatment of missing or corrupted data

Where data in the on-line system are corrupted or missing whilst the plant is operating the missing data can be estimated by taking the lower of the average value for the parameter in question in the hour before the error arose or the hour immediately after the system came on-line again. If there is evidence to suggest that both of these values are un-representative, the average from the previous 24 hours will be used.
The error will be recorded in the daily log sheet and the occurrence of the error will be investigated and rectified as soon as possible. If the on-line system is compromised for more than 24 hours, data will be manually recorded.

The CDM Project Manager is responsible for overseeing the implementation of this procedure. The CDM Project Manager will closely work with CDM Monitoring team, maintenance and calibration team and SCC CDM project officer. The CDM project manager will ensure that the data monitored are accurately recorded, properly archived, QA/QC procedure was timely carried out and the entire monitoring process is strictly in line with the CDM requirements.
The organizational structure will be as follows:



SECTION D. Data and parameters

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

Data / Parameter:	**$EF_{CO2,fuel,y}$**
Data unit:	Tonnes CO_2 per tonne
Description:	Default factor for gas oil / diesel
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value(s) :	3.186 tCO_2 per tonne
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Typical default value
Additional comment:	tCO_2/t EF negates the requirement for NCV and energy conversion

Data / Parameter:	**GWP_{CH4}**
Data unit:	T CO_2e
Description:	Global warming potential of methane
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value(s) :	21
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	This is the default value applied under the Kyoto Protocol
Additional comment:	No comment

Data / Parameter:	**$EF_{equipment,plant}$**
Data unit:	kg CH_4 per hour
Description:	Emission rates from leakage of methane from processing plant
Source of data used:	Processing plant design drawings and source list. AM0009 default emission factors

Value(s) :	Equip / $kgCH_4/hr$ / Number Valves 4.50E-03 215 Pump seals 2.40E-03 0 Other 8.80E-03 229 Connectors 2.00E-04 0 Flanges 3.90E-04 64 Open ended lines 2.00E-03 0 Valves (light oil) 2.50E-03 444 Pump seals (light oil) 1.30E-02 0 Other (light oil) 7.50E-03 0 Connectors (light oil) 2.10E-04 0 Flanges (light oil) 1.10E-04 481 Open ended lines 1.40E-03 0
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Calculated as the sum of methane emissions from all of the flanges, valves etc in the processing plant.
Additional comment:	No Comment

Data / Parameter:	**$EF_{equipment,pipeline}$**
Data unit:	kg CH_4 per hour leaking from pipelines
Description:	Summation of emissions from leakage of methane from pipeline
Source of data used:	Pipeline design drawings and AM0009 default emission factors
Value(s) :	Equip / $kgCH_4/hr$ / Number Valves 4.50E-03 4 Pump seals 2.40E-03 0 Other 8.80E-03 2 Connectors 2.00E-04 0 Flanges 3.90E-04 20 Open ended lines 2.00E-03 0
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Calculated as the sum of methane emissions from all of the flanges, valves etc in the pipeline. The design drawings show the following numbers of flanges, valves etc:
Additional comment:	No comment

D.2. Data and parameters monitored

Data / Parameter:	V_{Ay}
Data unit:	mmscf
Description:	The volume of gas recovered from the oil field at point A in Figure 1 in AM0009 ver2 during the period y in mmscf
Measured /Calculated /Default:	Measured
Source of data:	Continuous measurements at metering points 12" and 4". No gas has been provided through the 4" pipeline from 18th Oct 2008 onwards. All continuous flow meters recording input of associated gas are in addition to computer registration equipped with continuous Barton chart recorders
Value(s) of monitored parameter:	2,810.2404 mmscf
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions and project emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Orifice Plate Flow Meter Serial Number : 91F637499, 05.07 Calibration Frequency : Annually Date of last Calibration: 1 July 2010 Validity: 1 July 2011
Measuring/ Reading/ Recording frequency:	Continuously, recorded hourly
Calculation method (if applicable):	N/A
QA/QC procedures applied:	Ensure annual calibration is maintained throughout life of project. Request calibration 'as found' status to allow calibration errors to be assessed for materiality Ensure flow computer configured gas composition and or density values are updated monthly. Data trend to be analysed. Maintain calculation cell protection

Data / Parameter:	$W_{A,carbon,y}$
Data unit:	$kgCO_2/Sm^3$
Description:	Average content of carbon in the gas recovered at point A in figure 1 during the period y in $kgCO_2/m^3$
Measured /Calculated /Default:	Measured
Source of data:	Pertamina Laboratory test result (External Laboratory)
Value(s) of monitored parameter:	(see CER spreadsheet)
Indicate what the data are used for (Baseline/ Project/	Baseline & project emission calculations

Leakage emission calculations)	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Gas Chromatograph
Measuring/ Reading/ Recording frequency:	Weekly
Calculation method (if applicable):	N/A
QA/QC procedures applied:	Ensure sampling and analysis continues to be carried out in accordance to the ASTM or equivalent standards. Data trend to be analysed. Maintain calculation cell protection

Data / Parameter:	$\mathbf{V_{B,drygas,}}$
Data unit:	Mmscf
Description:	Quantity of dry gas that is produced in the gas processing plant (point B figure 1 in AM0009 ver2) during the period y in Mmscf
Measured /Calculated /Default:	Measured
Source of data:	Continuous measuring at the measuring point. All continuous flow meters recording input of associated gas are in addition to computer registration equipped with continuous Barton chart recorders
Value(s) of monitored parameter:	2,326.4689 mmscf
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline and project emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	M-01 Orifice Plate Flow meter Serial Number : USMMN 0509 0041, 111.09 Calibration frequency : annually Date of Last Calibration: 12 October 2009, 22 February 2011 Validity : 12 October 2010, 22 February 2012 The M-01 flow meter was down due to breakdown on the orifice system from 04/10/2010 at 09:30h till 22/02/2011at 00:00h. During this period, the dry gas production measurement was done by using flow meters M-02, M-03 and M-04 at the Tegal Gede station until the M-01 flow meter became operational again on 22 February 2011. M-02 Orifice Plate Flow meter Serial Number : USMMN 0509 0043, 112.09 Calibration frequency : annually

	Date of Last Calibration: 21 October 2009, 6 October 2010 Validity : 21 October 2010, 6 October 2011 M-03 Orifice Plate Flow meter Serial Number : USMMN 0509 0042, 113.09 Calibration frequency : annually Date of Last Calibration: 21 October 2009, 6 October 2010 Validity : 21 October 2010, 6 October 2011 M-04 Orifice Plate Flow meter Serial Number : 25172 Calibration frequency : annually Date of Last Calibration: 30 October 2009, 25 October 2010 Validity : 30 October 2010, 25 October 2011
Measuring/ Reading/ Recording frequency:	Measured continuously, recorded hourly
Calculation method (if applicable):	N/A
QA/QC procedures applied:	Ensure annual calibration is maintained throughout life of project. Request calibration 'as found' status to allow calibration errors to be assessed for materiality Ensure flow computer configured gas composition and or density values are updated monthly. Data trend to be analysed. Maintain calculation cell protection

Data / Parameter:	$\mathbf{W_{B,carbon,drygas,y}}$
Data unit:	$kgCO_2/Sm^3$
Description:	Average content of carbon in the gas recovered at point B in figure 1 during the period y in $kgCO_2/m^3$
Measured /Calculated /Default:	Measured
Source of data:	Pertamina Laboratory test result (External Laboratory)
Value(s) of monitored parameter:	(see CER spreadsheet)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline & project emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Gas Chromatograph
Measuring/ Reading/ Recording frequency:	Weekly

Calculation method (if applicable):	N/A
QA/QC procedures applied:	Ensure sampling and analysis continues to be carried out in accordance to the ASTM or equivalent standards. Data trend to be analysed. Maintain calculation cell protection

Data / Parameter:	$\mathbf{M_{LPG,B,y}}$
Data unit:	**kg or tonnes**
Description:	The quantity of LPG that is produced in the gas processing plant (point B Figure 1) during the period y in kg
Measured /Calculated /Default:	Measured
Source of data:	Measurement by calibrated weighbridge
Value(s) of monitored parameter:	10,005.1064 tonnes
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Weighbridge Mettler Toledo Type IND310 Serial Number : 0029136-6DH Calibration frequency: annually Date of last calibration: 20 November 2009, 25 November 2010 Validity: 28 November 2010, 25 November 2011
Measuring/ Reading/ Recording frequency:	Daily
Calculation method (if applicable):	
QA/QC procedures applied:	Ensure weighbridge remains calibrated through life of project. Data trend to be analysed. Maintain calculation cell protection

Data / Parameter:	$\mathbf{W_{B,carbon,LPG,y}}$
Data unit:	tCO_2/tonne
Description:	Carbon composition of LPG
Measured /Calculated /Default:	Measured
Source of data:	On-line Gas Chromatograph
Value(s) of monitored parameter:	See CER spreadsheet
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations
Monitoring equipment (type,	Gas Chromatograph Galvanic Applied

accuracy class, serial number, calibration frequency, date of last calibration, validity)	Model: PLGC-GC-6C Serial Number: SN0622GC2115 Calibration frequency: monthly against standard gas
Measuring/ Reading/ Recording frequency:	Weekly
Calculation method (if applicable):	N/A
QA/QC procedures applied:	Following GPA Std 2216-95 Analysis for natural gas and similar gas mixtures by chromatography and GPA Std 2172 Natural Gas Analysis by Gas Chromatograph Data trend to be analysed. Maintain calculation cell protection

Data / Parameter:	**$M_{B,condensate,y}$**
Data unit:	**kg or tonnes**
Description:	The quantity of condensate that is produced in the gas processing plant (point B figure 1) during the period y in kg.
Measured /Calculated /Default:	Measured
Source of data:	Calibrated weighbridge. All 3 quantification results (continuous flow metered data, calibrated weighbridge and calibrated road tanker information) are assessed (comparative analysis). Most accurate (lowest level of uncertainty) data set is used for reporting purposes.
Value(s) of monitored parameter:	Condensate : 2,846.5362 tonnes 1st Grade Condensate: 2,613.9311 tonnes 2nd Grade Condensate: 1,614.7326 tonnes
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Weighbridge Mettler Toledo Type IND310 Serial Number : 0029136-6DH Calibration frequency: annually Date of last calibration: 20 November 2009, 25 November 2010 Validity: 28 November 2010, 25 November 2011
Measuring/ Reading/ Recording frequency:	Daily
Calculation method (if applicable):	N/A
QA/QC procedures applied:	Ensure weighbridge remains calibrated through life of project. Data trend to be analysed. Maintain calculation cell protection

Data / Parameter:	**$W_{B,carbon,condensate,y}$**
Data unit:	tCO_2/tonne
Description:	Carbon composition of condensates

Measured /Calculated /Default:	Measured
Source of data:	Lemigas Laboratory (external) analysis results
Value(s) of monitored parameter:	See CER spreadsheets
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A
Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable):	N/A
QA/QC procedures applied:	Ensure sampling and analysis continues to be carried out in accordance to the ASTM or equivalent standards. Data trend to be analysed. Maintain calculation cell protection

Data / Parameter:	**$W_{CH4,plant}$**
Data unit:	kg CH_4 / kg
Description:	The average methane weight fraction in the respective stream in kg CH_4/kg
Measured /Calculated /Default:	Measured
Source of data:	Flow weighted average CH_4 of all feed and dry gas streams derived from CH_4 content of each of the following streams:- • 12" LP Input • M01 Dry gas Data are taken from Pertamina laboratory (external) analysis result
Value(s) of monitored parameter:	See CER spreadsheets
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A
Measuring/ Reading/ Recording frequency:	The AM0009/Version 02 (DD. 13 MAY 2005) is not specific on frequency of calculation. Monthly sampling, analysis calculation and application of emission

	factor is applied.
Calculation method (if applicable):	CH4 emission factor is calculated using the stoichiometric (vol) equation within the CER spreadsheet
QA/QC procedures applied:	Ensure sampling and analysis continues to be carried out in accordance to the ASTM or equivalent standards. Data trend to be analysed. Maintain calculation cell protection

Data / Parameter:	**$W_{CH4,pipeline}$**
Data unit:	kg CH_4 / kg
Description:	The average methane weight fraction in the pipeline in kg-CH_4/kg
Measured /Calculated /Default:	
Source of data:	CH_4 content of the M01 flow to pipeline Pertamina laboratory (external) results
Value(s) of monitored parameter:	See CER spreadsheets
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project Emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Gas Chromatograph
Measuring/ Reading/ Recording frequency:	The AM0009/Version 02 (DD. 13 MAY 2005) is not specific on frequency of calculation. Monthly sampling, analysis calculation and application of emission factor is applied.
Calculation method (if applicable):	CH_4 emission factor is calculated using the stoichiometric (vol) equation within the CER Spreadsheet
QA/QC procedures applied:	Ensure sampling and analysis continue to be carried out in accordance to the ASTM or equivalent standards. Data trend to be analysed. Maintain calculation cell protection.

Data / Parameter:	**$EF_{equipment,pipeline\ from\ Tambun\ to\ Tegal\ Gede}$**
Data unit:	kg CH_4 per hour leaking from pipelines
Description:	Summation of emissions from leakage of methane from pipeline from Tambun plant to Tegal Gede.
Source of data used:	Pipeline design drawings from Tambun plant to Tegal Gede and AM0009 default emission factors
Value(s) :	Equip / $kgCH_4$/hr / Number Valves 4.50E-03 118 Pump seals 2.40E-03 0 Other 8.80E-03 5

	Connectors	2.00E-04	0
	Flanges	3.90E-04	209
	Open ended lines	2.00E-03	0

Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Calculated as the sum of methane emissions from all of the flanges, valves etc in the pipeline from Tambun plant to Tegal Gede. The design drawings show the following numbers of flanges, valves etc.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	No comment
Measuring/ Reading/ Recording frequency:	
Calculation method (if applicable):	
QA/QC procedures applied	

Data / Parameter:	**Mfuel,,y**
Data unit:	Tonnes
Description:	Consumption of diesel by LPG plant. During this monitoring period the diesel has been consumed for testing of fire pumps and emergency gensets
Measured /Calculated /Default:	Measured
Source of data:	Monthly diesel (gas oil) deliveries plus opening stock less closing stock from tank dips * Standard density
Value(s) of monitored parameter:	0.56698 Tonnes
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project Emission
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Stock measurement (tank dips) and delivery.
Measuring/ Reading/ Recording frequency:	Every delivery/consumption – stock begin and end period.

Calculation method (if applicable):	-
QA/QC procedures applied:	Stock take carried out to recognised standard Monthly Diesel Report total transcribed correctly to Monitoring Report

Data / Parameter:	**$T_{equipment}$**
Data unit:	Hours
Description:	Operation time of equipment
Measured/ Calculated/ Default	Measured
Source of data used:	Operational data
Value(s) of monitored parameter :	3624 hours (no shutdown during monitoring period)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project Emission
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A
Measuring/ Reading/ Recording frequency:	Continuous
Calculation method (if applicable):	N/A
QA/QC procedures applied	SCC Project officer will double check with the Odira Plant Manager for any planned and unplanned shutdown and update the operation time accordingly

Parameters to be monitored specifically when accidental event occurred:

Data / Parameter:	**T_1 and T_2**
Data unit:	Time
Description:	Time between 1st evidence of leak and shutdown valves closing

Measured/ Calculated/ Default	Measured
Source of data used:	Pressure, temperature and flow rate
Value(s) of monitored parameter :	Not applicable. During this monitoring period no accidental event occurred.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project Emission (Calculation of $V_{A,accident}$)
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A
Measuring/ Reading/ Recording frequency:	Continuous
Calculation method (if applicable):	N/A
QA/QC procedures applied	SCC Project officer will double check with the Odira Plant Manager

Data / Parameter:	**F**
Data unit:	Sm^3 per hour
Description:	Pipeline entry flow rate
Measured/ Calculated/ Default	Measured
Source of data used:	Sum of M-01 and 4' HP bypass metered data No gas has been provided through the 4" pipeline from 18th Oct 2008 onward
Value(s) of monitored parameter :	Not applicable. During this monitoring period no accidental event occurred.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project Emission (Calculation of $V_{A,accident}$)
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A

Measuring/ Reading/ Recording frequency:	Continuous
Calculation method (if applicable):	N/A
QA/QC procedures applied	SCC Project officer will double check with the Odira Plant Manager Meters used as per baseline determination. Metering QA/QC assured through calibration program

Data / Parameter:	$\mathbf{T_{pipeline}}$
Data unit:	Degrees centigrade
Description:	Temperature in pipeline at time of valve closure
Measured/ Calculated/ Default	Measured
Source of data used:	Pipeline section temperature transmitter
Value(s) of monitored parameter :	Not applicable. During this monitoring period no accidental event occurred.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project Emission (Calculation of $V_{remain,,accident}$)
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A
Measuring/ Reading/ Recording frequency:	Continuous
Calculation method (if applicable):	N/A
QA/QC procedures applied	SCC Project officer will double check with the Odira Plant Manager

SECTION E. Emission reductions calculation

E.1. Baseline emissions calculation

>>

The formula used for determination of the baseline emissions are described in section B.6.1 of the Project Design Document v4.3 dated 6 November 2009, and available upon the UNFCCC website (http://cdm.unfccc.int/Projects/DB/LRQA%20Ltd1180000727.07/view

Baseline emissions are calculated as follows:

$$BL_y = V_{A,y} \cdot W_{carbon,A,y} \cdot \frac{44}{12} \cdot \frac{1}{1000}$$

where:

BL_y Are the baseline emissions during the period y in tons of CO_2 equivalents.

$V_{A,y}$ Is the volume of gas recovered from the oil field during the period y in m^3.

$w_{carbon,A,y}$ Is the average content of carbon in the gas recovered during the period y in kg-C/m^3.

The average methane content in the gas $w_{CH4,A,y}$ is determined from regular measurements of the composition of the gas, taking into account the molecular weight of all fractions of the gas.

The input parameters are summarized in the following table

Data Input

							Condensate		
Date		**Month**	**12" LPGas**	**4" HPGas**	**MO-1 Dry Gas**	**LPG**	**LPG**	**1st Grade**	**2nd Grade**
From	**To**		**mmscf**	**mmscf**	**mmscf**	**t**	**t**	**t**	**t**
1	31	Oct	627.545		509.440	2,674.042	733.732	517.342	449.820
1	30	Nov	556.930		461.469	2,110.522	596.506	499.078	357.684
1	31	Dec	546.059		471.031	1,755.874	496.867	556.920	302.874
1	31	Jan	590.515		499.688	1,816.788	522.776	572.219	287.154
1	28	Feb	489.192		385.840	1,647.881	496.657	468.372	217.200
Total			**2,810.240**	**0**	**2,326.469**	**10,005.106**	**2,846.536**	**2,613.931**	**1,614.733**

Remarks

No gas has been provided through the 4" pipeline from 18th Oct 2008 onward

The MO-1 Dry gas volume mentioned above is the sum of MO2,MO3 and MO4 for the period 05/10/2010 – 22/02/2011

Baseline Emission Calculations

Date		**Month**	**12" LP Gas**			**4" HP Gas**		
From	**To**		**Sm^3**	**$kgCO_2/Sm^3$**	**tCO_2**	**Sm^3**	**$kgCO_2/Sm^3$**	**tCO_2**
1	31	Oct	17,770,100.465	3.039	53,999.649			
1	30	Nov	15,770,498.173	3.069	48,399.989			
1	31	Dec	15,462,667.962	3.076	47,567.182			
1	31	Jan	16,721,516.183	2.989	49,974.406			
1	28	Feb	13,852,373.654	3.039	42,103.310			
Total			**79,577,156.437**		**242,044.535**	0	0	0

No gas has been provided through the 4" pipeline from 18th Oct 2008 onward

E.2. Project emissions calculation

>>

The formulas used for determination of the project emissions are described in section B.6.1 of the Project Design Document v4.3 dated 6 November 2009 and available upon the UNFCCC website (http://cdm.unfccc.int/Projects/DB/LRQA%20Ltd1180000727.07/view).

Project emissions are calculated as follows:

$$PE_{CO2,gas,y} = \frac{m_{carbon,A,y}}{m_{carbon,A,y} + m_{carbon,X,y}} \cdot \left(m_{carbon,A,y} + m_{carbon,X,y} - m_{carbon,B,y}\right) \cdot \frac{44}{12} \cdot \frac{1}{1000}$$

with

$$m_{carbon,A,y} = V_{A,y} \cdot w_{Carbon,A,y}$$

$$m_{carbon,B,y} = V_{B,dry\ gas,y} \cdot w_{carbon,dry\ gas,B,y} + m_{LPG,B,y} \cdot w_{carbon,LPG,B,y} + m_{condensate,B,y} \cdot w_{carbon,condensate,B,y}$$

$$m_{carbon,X,y} = \sum_{i} V_{Xi,y} \cdot w_{Carbon,Xi,y}$$

where:

$PE_{CO2,gas,y}$	Are the CO_2 emissions from the project activity due to combustion, flaring or venting of recovered gas during the period y in tons of CO_2.
$M_{carbon,A,y}$	Is the quantity of carbon in the recovered gas from the project area in during the period y in kg.
$m_{carbon,B,y}$	Is the quantity of carbon in the products (dry gas, LPG, condensate) leaving the gas processing plant during the period y in kg.
$m_{carbon,X,y}$	Is the quantity of carbon in recovered gas from other oil wells at all points Xi during the period y in kg.
$V_{B,dry\ gas,y}$	Is the quantity of dry gas that is produced in the gas processing plant during the period y in m^3.
$m_{LPG,B,y}$	Is the quantity of LPG that is produced in the gas processing plant during the period y in kg.
$m_{condensate,B,y}$	Is the quantity of condensate that is produced in the gas processing plant during the period y in kg.
$V_{A,y}$	Is the volume of gas recovered during the period y in m^3.
$V_{Xi,y}$	Is the volume of gas recovered from oil well I during the period y in m^3.
$w_{carbon,A,y}$	Is the average content of carbon in the gas recovered during the period y in kg-C/m^3.
$w_{carbon,dry\ gas,B,y}$	Is the average content of carbon in dry gas during the period y in kg-C/m^3.
$w_{carbon,LPG,B,y}$	Is the average content of carbon in LPG during the period y in kg-C/kg.
$w_{carbon,condensate,B,y}$	Is the average content of carbon in condensate during the period y in kg-C/kg.
$w_{carbon,Xi,y}$	Is the average content of carbon in the gas recovered from oil well i during the period y in kg-C/m^3.

The calculations are summarized in the tables below:

Project Emission Calculation

Date		Month	VA	Wcar bonA	McarbonA	Vdrygas	Wcarbdrygas	Mcarbdrygas
From	To		Sm3	kgC/S m3	tCO2	Sm3	kgC/Sm3	tCO2
1	31	Oct	17,770,100.465	3.039	53,999.649	14,425,745.961	2.522	36,387.411
1	30	Nov	15,770,498.173	3.069	48,399.989	13,054,767.098	2.509	32,753.745
1	31	Dec	15,462,667.962	3.076	47,567.182	13,309,052.023	2.622	34,896.160
1	31	Jan	16,721,516.183	2.989	49,974.406	13,908,412.266	2.681	37,285.662
1	28	Feb	13,852,373.654	3.039	42,103.310	10,875,972.560	2.614	28,426.369
Total			**79,577,156.437**		**242,044.535**	**65,878,270.302**		**170,557.956**

Date		Month	MLPG	WcarbLPG	McarbonLPG	Mcarbonconden	McarbonB
From	To		t	tCO2/t	tCO2	tCO2	tCO2
1	31	Oct	2,674.042	3.010	8,049.755	5,213.063	49,650.229
1	30	Nov	2,110.522	3.010	6,353.209	4,431.996	43,570.518
1	31	Dec	1,755.874	3.010	5,285.402	4,137.196	44,394.949
1	31	Jan	1,816.788	3.010	5,469.004	4,217.051	47,542.388
1	28	Feb	1,647.881	3.010	4,959.431	3,605.218	37,121.196
Total			**10,005.106**		**30,116.800**	**21,604.524**	**222,279.281**

Date		Month	V CondLPG	SG CondLPG	M CondLPG	Wcarbon condenLPG	Mcarbon LPG
From	To		t	tCO2/t	tCO2	tCO2	tCO2
1	31	Oct	1,128.82	0.65	733.73	3.06	2,244.60
1	30	Nov	917.70	0.65	596.51	3.05	1,818.25
1	31	Dec	764.41	0.65	496.87	3.05	1,514.53
1	31	Jan	804.27	0.65	522.78	3.06	1,597.25
1	28	Feb	764.09	0.65	496.66	3.06	1,517.44
Total			**4,379.29**		**2,846.54**		**8,684.79**

Date		Month	Vcond 1st grade	SGcond 1st grade	Mcond 1st grade	Wcarboncond 1st grade	Mcarboncond 1st grade
From	To		t	tCO2/t	tCO2	tCO2	tCO2
1	31	Oct	760.80	0.68	517.34	3.07	1,586.66
1	30	Nov	733.94	0.68	499.08	3.05	1,522.04
1	31	Dec	819.00	0.68	556.92	3.05	1,698.44
1	31	Jan	841.50	0.68	572.22	3.07	1,754.95
1	28	Feb	688.78	0.68	468.37	3.07	1,435.79
Total			**3,844.02**		**2,613.93**		**7,980.64**

Date		Month	Vcond 2nd grade	SGcond 2nd grade	Mcond 2nd grade	Wcarboncond 2nd grade	Mcarboncond 2nd grade
From	To		t	tCO2/t	tCO2	tCO2	tCO2
1	31	**Oct**	633.55	0.71	449.82	3.07	1,381.80
1	30	**Nov**	503.78	0.71	357.68	3.05	1,091.71
1	31	**Dec**	427.25	0.71	302.81	3.05	924.22
1	31	**Jan**	402.92	0.71	287.89	3.07	878.44
1	28	**Feb**	301.67	0.72	217.20	3.07	662.93
Total			**2,269.17**		**1,615.41**		**4,939.10**

If other fossil fuels than the recovered gas are consumed at the oil well and if this consumption is a result of the project activity (e.g. substitution of gas for on-site generation or use in the compressor station), CO_2 emissions from combustion of these fuels should also be accounted.

$$PE_{CO2,other\ fuels,y} = \frac{1}{1000} \cdot \sum_{Fuels} m_{fuel,y} \cdot NCV_{fuel} \cdot EF_{CO2,fuel}$$

where:

$PE_{CO2,other\ fuels,y}$ Are the CO_2 emissions due to consumption of other fuels than the recovered gas due to the project activity during the period y in tons of CO_2.

$m_{fuel,y}$ Is the quantity of a specific fuel type that is consumed due to the project activity during the period y in kg.

NCV_{fuel} Is the net calorific value of the respective fuel type in kJ/kg.

$EF_{CO2,fuel}$ Is the CO_2 emission factor of the respective fuel type in kg CO_2/kJ.

Project Emission (other)

Diesel Oil Usage	**Volume**	**Mass**	**Mass**	**Mass**
Period	liter	kg	$kgCO_2$	tCO_2
October	73	61.50	195.96	0.20
November	150	126.37	402.65	0.40
December	207	174.39	555.66	0.56
January	109	91.83	292.59	0.29
February	134	112.89	359.70	0.36
Total	673	566.98	1,806.55	**1.81**

CH4 emissions from recovery and processing the gas

Fugitive CH_4 emissions occurring during the recovery and processing of gas may in some projects be small, but should be estimated as a conservative approach. Emission factors are taken from the IPCC Good Practice Guidance and/or from the 1995 Protocol for Equipment Leak Emission Estimates,

published by EPA2. Emissions are determined for all relevant activities and all equipment (such as valves, pump seals, connectors, flanges, open-ended lines, etc.)

Methane emissions are calculated for each single equipment by multiplying the CH4 concentration in the respective stream with the appropriate emission factor as indicated in Table 1 of AM0009/version02.

$$PE_{CH4,plants,y} = GWP_{CH4} \cdot \frac{1}{1000} \cdot \sum_{equipment} w_{CH4,stream} \cdot EF_{equipment} \cdot T_{equipment}$$

where:

$PE_{CH4,plants,y}$ Are the CH4 emissions from the project activity at the gas recovery facility and the gas processing plant during the period y in tons of CO2 equivalents.

GWP_{CH4} Is the approved Global Warming Potential for methane.

$T_{equipment}$ Is the operation time of the equipment in hours (in absence of further information, the monitoring period could be considered as a conservative approach).

$w_{CH4,A,y}$ Is the average methane weight fraction in the respective stream in kg-CH_4/kg.

$EF_{equipment}$ Is the appropriate emission factor from Table 1 (AM0009/version02) in kg/hour/equipment.

Equipment Type	Factor	Number	CH_4	CO_2e
	kg/hr		ton	ton
Valves	4.50E-03	215	1.41	29.51
Pump seals	2.40E-03	0	0.00	0.00
Other	8.80E-03	229	2.93	61.47
Connectors	2.00E-04	0	0.00	0.00
Flanges	3.90E-04	64	0.04	0.76
Open ended lines	2.00E-03	0	0.00	0.00
Valves (light oil)	2.50E-03	444	1.61	33.85
Pump Seals (light oil)	1.30E-02	0	0.00	0.00
Other (light oil)	7.50E-03	0	0.00	0.00
Connectors (light oil)	2.10E-04	0	0.00	0.00
Flanges (light oil)	1.10E-04	481	0.08	1.61
Open ended lines	1.40E-03	0	0.00	0.00
Total			6.06	127.22

CH_4 emissions from transport of the gas in pipelines under the normal operation condition

Fugitive CH_4 emissions occurring during the transport of the gas in pipelines are estimated as the same approach as "CH_4 emissions from recovery and processing the gas", explained above.

$$PE_{CH4,pipeline,y} = GWP_{CH4} \cdot \frac{1}{1000} \sum_{equipment} w_{CH4,pipeline} \cdot EF_{pipeline} \cdot T_{equipment}$$

where:

$PE_{CH4,pipeline,y}$	Are the CH_4 emissions from the project activity during the transport of the gas in pipelines under the normal operation during the period y in tons of CO_2 equivalents.
GWP_{CH4}	Is the approved Global Warming Potential for methane.
$w_{CH4,pipeline}$	Is the average methane weight fraction in the pipeline in kg-CH_4/kg.
$EF_{pipeline}$	Is the appropriate emission factor from Table 1 (AM0009/version02) in kg/hour/pipeline
$T_{equipment}$	Is the operation time of the equipment in hours (in absence of further information, the monitoring period could be considered as a conservative approach)

Fugitive emission from pipeline ($PECH_{4Pipeline}$)

Equipment Type	Factor	Number	CH_4	CO_2e
	Kg/hr		ton	ton
Valves	4.50E-03	4	0.03	0.73
Pump Seals	2.40E-03	0	0.00	0.00
Other	8.80E-03	2	0.03	0.71
Connectors	2.00E-04	0	0.00	0.00
Flanges	3.90E-04	20	0.01	0.31
Open ended lines	2.00E-03	0	0.00	0.00
Total			0.08	1.75

Fugitive emission from pipeline ($PECH_{4Pipeline}$) from Tambun plant to Tegal Gede

Equipment Type	Factor	Number	CH_4	CO_2e
	Kg/hr		ton	ton
Valves	4.50E-03	118	1.02	21.39
Pump Seals	2.40E-03	0	0.00	0.00
Other	8.80E-03	5	0.08	1.77
Connectors	2.00E-04	0	0.00	0.00
Flanges	3.90E-04	209	0.16	3.28
Open ended lines	2.00E-03	0	0.00	0.00
Total			1.26	26.45

CH_4 emissions from transport of the gas in pipelines when accidental event occurred

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. In the interest of conservativeness, the volume set out above should be estimated as the gas leakage from a pipeline caused by an accident.

CH_4 emissions from the transport of the gas in pipelines when accidental event occurred can be calculated as:

$$PE_{CH4,pipeline,accident} = GWP_{CH4} \cdot \frac{1}{1000}(V_{A,accident} + V_{remain,accident}) \cdot W_{CH4,pipeline,accident}$$

with:

$$V_{A,accident} = t_{accicdent} \cdot F = (t_2 - t_1) \cdot F$$

$$V_{remain,accident} = d^2 \cdot \pi \cdot L \cdot \frac{P_p}{P_s} \cdot \frac{T_s}{T_p} \cdot \frac{V_{A,d,accident}}{\sum_i V_{Xi,d,accident}}$$

where:

$PE_{CH4, pipeline, accident}$	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.
$VA_{,t, accident}$	Is the volume of gas supplied from the oil well from the time the gas leakage started until the shutdown valves closed the pipeline in m^3.
$V_{remain,accident}$	Is the volume of gas remaining in the pipeline after the shutdown valves close the pipeline in m^3.
$W_{CH4, pipeline, accident}$	Is the average methane weight fraction in the gas recovered in kg-CH_4/m^3
$t_{accident}$	Is the time difference between t1 and t2 determined as "retention time" in seconds.
t1	Is the time the gas leakage caused by the accident occurred. "t1" is determined based on the continuous monitoring data such as pressure etc.
t2	Is the time that the shutdown valves closed both the upstream and downstream pipeline. "t2" is determined based on the operation data.
F	Is the flow rate of gas supplied from the oil well
d	Is the radius of the pipeline in meters. The data is derived from P & I (Piping and Instrument).
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).
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.
$VA_{, d, accident}$	Is the volume of gas supplied to the pipeline from oil well before the accident occurs during the period day in m^3.
$V_{xi, d, accident}$	Is the volume of gas supplied to the pipeline from oil well i before the accident occurs during the period day in m^3.

During the monitoring period no accidental events occurred.

E.3. Leakage calculation

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N/A

E.4. Emission reductions calculation / table

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Date		Month	Baseline	$PECO_2$ Gas	$PECO_2$ other	$PECH_4$ plant	$PECH_4$ pipeline	$PECH_4$ accident	Total Project Emission	CER
From	To									
1	31	**Oct**	53,999.649	4,349.420	0.196	26.118	5.789	0.000	4,381.523	49,618.126
1	30	**Nov**	48,399.989	4,829.471	0.403	25.275	5.603	0.000	4,860.751	43,539.238
1	31	**Dec**	47,567.182	3,172.233	0.556	26.118	5.789	0.000	3,204.695	44,362.487
1	31	**Jan**	49,974.406	2,432.017	0.293	26.118	5.789	0.000	2,464.217	47,510.189
1	28	**Feb**	42,103.310	4,982.114	0.360	23.590	5.229	0.000	5,011.293	37,092.017
Total			242,044.535	19,765.255	1.807	127.219	28.199	0.000	19,922.480	222,122.056
Total Round Down			**242,044.000**	**19,766.000**	**2.000**	**128.000**	**29.000**	**0.000**	**19,925.000**	**222,119.000**

Total CER 1 October 2010 – 28 February 2011 (inclusive of both days) = 222,119 tCO_2eq.

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

>>

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

Item	Values applied in ex-ante calculation of the registered CDM-PDD 4.3 Appendix 2	Actual values reached during the monitoring period
Emission reductions (tCO_2e)	**309,473.21**	**222,119**

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

>>

As per registered PDDv4.3 (Scenario 2), the maximum emission reduction generated by this project activity within the proposed Monitoring period is 309,473 ton of CO_2 whereas the actual emission reduction is 222,119 ton of CO_2. Hence, the actual CER generation is lower than the values applied in ex-ante calculation of the registered PDD. The reason for lower emission reduction during the monitoring period can be attributed to lower than estimated gas delivery to the plant.

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Annex A Monitored Parameters

Parameter	Data Set / Document	Data		Storage	Soft Copies		Retention Time
		Output	Format	Location	Transcribed to	Location	Crediting Period +2 year
$V_{A,y}$	Flow Meter 12" (Orifice Meter)	Hourly data, Flow Computer Pertamina	Soft/Hard copy (print out)	Pertamina Control Room /	Morning and Monthly Report	Odira Office, SCC Office	Crediting Period +2 year
		Barton charts	Hard copy (card read out)	Pertamina Control Room	Morning reports back-up	Odira Office, SCC Office	Crediting Period +2 year
	Flow Meter 4" (Orifice Meter)	Hourly data, Flow Computer Pertamina	Soft/Hard copy (print out)	Pertamina Control Room / Odira Plant	Morning and Monthly Report	Odira Office, SCC Office	Crediting Period +2 year
		Barton charts	Hard copy (card read out)	Pertamina Control Room	Morning reports back-up	Odira Office, SCC Office	Crediting Period +2 year
$W_{carbon,A,y}$	Pertamina Tegal Gede Gas Chromatograph (GC)	Weekly Composition	Hard copy	Pertamina Lab/ Odira Plant	CDM Monitoring Report Spreadsheet	Odira Office, SCC Office	Crediting Period +2 year
$V_{B,dry\ gas,y}$	Flow Meter M-01 (Orifice Meter)	Hourly data, Flow computer	Soft/Hard copy (print out)	Odira Plant	Morning and Monthly Report	Odira Office, SCC Office	Crediting Period +2 year
		Barton charts	Hard copy (card read out)	Odira Plant	Morning reports back-up	Odira Office, SCC Office	Crediting Period +2 year
$W_{carbon,dry\ gas,B,y}$	Pertamina GC	Weekly Composition	Hard copy	Pertamina Lab/ Odira Plant	CDM Monitoring Report Spreadsheet	Odira Office, SCC Office	Crediting Period +2 year
$M_{LPG,B,y}$	Orifice meter, weighbridge	Continuous Recording, Daily Aggregation	Hard copy	Odira Plant	Morning and Monthly Report	Odira Office, SCC Office	Crediting Period +2 year
$W_{carbon,LPG,B,y}$	Odira Gas Chromatograph	Weekly Composition	Hard copy	Odira Plant	CDM Monitoring Report Spreadsheet	Odira Office, SCC Office	Crediting Period +2 year
$M_{Condensate,B,y}$	Orifice meter, Micro meter, Turbine meter, weighbridge, roadtankers	Continuous Recording, Daily Aggregation	Hard copy	Odira Plant	Morning and Monthly Report	Odira Office, SCC Office	Crediting Period +2 year

Parameter	Data Set / Document	Data	Storage	Soft Copies			Retention Time
		Output	Format	Location	Transcribed to	Location	
W $c_{arbon, Condensate, B, y}$	Lemigas Lab Instruments	Monthly Composition	Hard copy	Lemigas/ Odira Plant	CDM Monitoring Report Spreadsheet	Odira Office, SCC Office	Crediting Period +2 year
M fuel, y	Not applicable						
W $_{carbon, IPCC}$	Not applicable						
Fugitive Emissions	Plant Survey	Survey Report	Hard/Soft Copy	SCC Office (S server)	CDM Monitoring Report Spreadsheet	Odira Office, SCC Office	Crediting Period +2 year
T $_{equipment}$	Time recording	Operation Data	Hard Copy	Odira Operational Control Room	CDM Monitoring Report Spreadsheet	Odira Office, SCC Office	Crediting Period +2 year
W $_{CH4,A,y}$	Plant Survey	Survey Report	Hard/Soft Copy	SCC Office (S server)	CDM Monitoring Report Spreadsheet	Odira Office, SCC Office	Crediting Period +2 year
Fugitive Emissions	Plant Survey	Survey Report	Hard/Soft Copy	SCC Office (S server)	CDM Monitoring Report Spreadsheet	Odira Office, SCC Office	Crediting Period +2 year
T $_{equipment, pipeline}$	Time recording	Operation Data	Hard Copy	Odira Operational Control Room	CDM Monitoring Report Spreadsheet	Odira Office, SCC Office	Crediting Period +2 year
W $_{CH4, pipeline}$	Plant Survey	Survey Report	Hard/Soft Copy	SCC Office (S server)	CDM Monitoring Report Spreadsheet	Odira Office, SCC Office	Crediting Period +2 year
T1, T2	Time recording	Operation Data	Hard Copy	Odira Operational Control Room	CDM Monitoring Report Spreadsheet	Odira Office, SCC Office	Crediting Period +2 year
P	Pressure Pipeline	Operation Data	Hard Copy	Odira Operational Control Room	CDM Monitoring Report Spreadsheet	Odira Office, SCC Office	Crediting Period +2 year
T	Temperature Pipeline	Operation Data	Hard Copy	Odira Operational Control Room	CDM Monitoring Report Spreadsheet	Odira Office, SCC Office	Crediting Period +2 year
CER Calculation	CDM Monitoring Spreadsheet	Emission reduction data	Xls format	SCC Office (S-server)			Crediting Period +2 year
CDM Monitoring Report		Emission reduction data	Soft/hard Copy	SCC Office (S server)			Crediting Period +2 year
Internal Audit Report(s)		QC/QA	Soft Copy	SCC Office (S server)			Crediting Period +2 year
Maintenance Reports		QC/QA	Hard/soft copy	Odira Plant (Maintenance Dept)			Crediting Period +2 year
Calibration Records		QC/QA	Hard/soft copy	Odira Plant (Maintenance Dept)/SCC Office (S-server)			Crediting Period +2 year
Project Design Document			UNFCC Website / SCC Office (S server)				Crediting Period +2 year
Approved Methodology			UNFCC Website / SCC Office (S server)				Crediting Period +2 year
DOE verification reports			SCC Office (S server)				Crediting Period +2 year

ANNEX B. Monitoring Instrument

Meter and its Location	Name of Instrument	Instrument Serial No./ Orifice Plate #/ Tag#	Measuring	Calibration Frequency	Remarks	Calibration Date	Next Calibration
12" LP Wet Gas Input Flow Meter	Orifice Plate Flow Meter	91F637499 05.07	Wet Gas Input	Yearly	This meter is subject to government regulation and Metrology Department inspection & calibration	01 July 2010	01 July 2011
M-01 Dry Gas Flow Meter	Orifice Plate Flow Meter	USMMN 0509 0041 111.09	Dry Gas	Yearly	This meter is subject to government regulation and Metrology Department inspection & calibration	22 Feb 2011 12 Oct 2009	22 Feb 2012 12 Oct 2010
M-02 Dry Gas Flow Meter (Tegal Gede Station)	Orifice Plate Flow Meter	USMMN 0509 0043 112.09	Dry Gas	Yearly	This meter is subject to government regulation and Metrology Department inspection & calibration	6 Oct 2010	6 Oct 2011
M-03 Dry Gas Flow Meter (Tegal Gede Station)	Orifice Plate Flow Meter	USMMN 0509 0042 113.09	CNG	Yearly	This meter is subject to government regulation and Metrology Department inspection & calibration	6 Oct 2010	6 Oct 2011
M-04 Dry Gas Flow Meter (Tegal Gede Station)	Orifice Plate Flow Meter	25172	Dry Gas	Yearly	This meter is subject to government regulation and Metrology Department inspection & calibration	25 Oct 2010 30 Oct 2009	25 Oct 2011 30 Oct 2010

LPG Flow Meter	Orifice Plate Flow Meter	FIT 405A	LPG	Yearly	This meter is subject to government regulation and Metrology Department inspection & calibration	2 Dec 2010 8 Dec 2009	30 Nov 2011 8 Dec 2010
LPG Cond Flow Meter	Orifice Plate Flow Meter	FIT 407	Condensate LPG	Yearly	This meter is subject to government regulation and Metrology Department inspection & calibration	2 Dec 2010 8 Dec 2009	30 Nov 2011 8 Dec 2010
1st Grade Condensate Flowmeter	Coriolis	14014222	1st Grade Condensate	Yearly	This meter is subject to government regulation and Metrology Department inspection & calibration	30 Nov 2010 8 Dec 2009	30 Nov 2011 30 Nov 2010
2nd Grade Condensate Flowmeter **(Broken)**	Turbine	111125	2nd Grade Condensate	Yearly	This meter is subject to government regulation and Metrology Department inspection & calibration	7 April 2008	7 April 2009
Weighbridge at Tambun Plant	Weighbridge	0029136-6DH	LPG, Condensate, 1st Grade Condensate, 2nd Grade Condensate	Yearly	The weighbridge is subject to government regulation and Metrology Department inspection & calibration	26 Nov 2010 20 Nov 2009	25 Nov 2011 28 Nov 2010
LPG Line Gas Chromatography	Gas Chromatography	SN0622GC2115	LPG composition	Monthly	Sampling is carried out in accordance to ASTM or equivalent standards. Calibration is done		

					using standard gas.		