CARBON CAPITAL MARKETS®

UNFCCC Joint Implementation Monitoring Report
Version: 1

Landfill Methane Capture and Flaring At Yalta and Alushta Landfills, Ukraine

JI Project Reference Number: 0050
Monitoring period: 2008-06-01 – 2010-03-31
Date: 2010-05-10

1. GENERAL PROJECT INFORMATION

1.a. Project Background

The project "Landfill methane capture and flaring at Yalta and Alushta landfills {hereinafter referred to as "the sites"}, Ukraine" {hereinafter referred to as "the project"} consists of developing a Landfill Gas ("LFG") collection and flaring system in order to avoid emissions of methane being released into the atmosphere. LFG production results from waste decay in the anaerobic conditions created in the landfill body and contains approximately 50% methane ("CH4"), which is a powerful greenhouse gas ("GhG") contributing to global warming. Additionally, LFG is a fire hazard and causes bad odours in the vicinity of the site. By capturing the LFG, GhG emissions are reduced, local environmental impacts are mitigated and the operational safety of the site is increased.

The Project is located in the Autonomous Republic of Crimea in the Ukraine on the Black Sea at the municipal landfills of Yalta and Alushta. The two towns are located approximately 30 km apart. Yalta has a population of 150,000 inhabitants and Alushta has 60,000 inhabitants. Further background information on this project can be obtained from the Project Design Document ("PDD") available on the UNFCCC - JI website:
URL: http://ji.unfccc.int/JIITLProject/DB/1FC65W96MRGI985P0SSYVODU119FSC/details

The starting date of the project, in accordance with the registered PDD, is June 1, 2008. The calculated emission reductions amount to **55,275 tCO_{2eq} for the period 2008-06-01 to 2010-03-31**. A detail breakdown of the ERU results is included in Annex 1 of this report. It should be noted that the emission reductions are claimed several months after the registered starting date in the PDD. The emission reductions are claimed starting in November of 2008 and September of 2008 for Yalta and Alushta, respectively, since the formal operation of the project started later than expected due to a longer than expected commissioning period.

1.b. Methodology applied to the project Activity
The project applies the methodology ACM0001 ver. 05 (consolidated baseline and monitoring methodology for landfill gas projects activities) for baseline calculation and monitoring activities.

1. PARTIES INVOLVED

2.a. Project participants

The parties involved in this project are:	
Host country	Ukraine
Other parties	United Kingdom
Project owner	Carbon Assets Fund Ukraine, LLC (thereafter referred to as "CAF-UA")
Technical developer	Gafsa Limited (thereafter referred to as "Gafsa")
Annex-1 Project Participant	Carbon Capital Markets Ltd (thereafter referred to as "CCM")

2.b. Parties responsible for the preparation and submission of the monitoring report

This monitoring report was developed and revised by:	
Kevin Lok/Serhiy Porovskyy	Carbon Capital Markets Ltd. (thereafter referred to as "CCM")

2. KEY MONITORING ACTIVITIES

3.a. Monitoring Background

The calculations of emission reductions have been performed according to the formulas and specifications of ACM0001 ver. 05, which are described in the monitoring plan of the PDD. With this, the project emissions were calculated according to the methodological "Tool to determine project emissions from flaring gases containing methane" (Annex 13, EB 28), ("Tool").

3.b. Monitoring equipment

Yalta

Equipment ID	Parameters monitored	Description	Drawing #	Notes
A 141	$w_{CH4, y;}$	Gas Analyser	K- 10128	System inlet measurement
	$fv_{CH4, h}$			
	$fv_{CO2, h}$			
	$fv_{O2, h}$			
PIR61.5	P	Pressure Transmitter	K- 10128	Flare inlet measurement. Since the flow is recorded at NTP, the pressure is not used in calculations, but is recorded to be complete
TIR61.5	T	Temperature Transmitter	K- 10128	Flare inlet measurement. Since the flow is recorded at NTP, the temperature is not used in calculations, but is recorded to be complete
TIRCAH 81.24	T_{flare}	Thermocouple	K- 10128	Flare measurement
A 151	$fv_{CH4,FG,h}$	Flue Gas Analyser	K- 10128	Flare outlet measurement
	$t_{O2,h}$			
FIR 61.5	$LFG_{total, y}$	Flow Meter	K- 10128	Generator inlet measurement

Alushta

Equipment ID	Parameters monitored	Description	Drawing #	Notes
A 141	$w_{CH4, y;}$	Gas Analyser	K- 10129	System inlet measurement
	$fv_{CH4, h}$			
	$fv_{CO2, h}$			
	$fv_{O2, h}$			
PIR61.5	P	Pressure Transmitter	K- 10129	Flare inlet measurement. Since the flow is recorded at NTP, the pressure is not used in calculations, but is recorded to be complete
TIR61.5	T	Temperature Transmitter	K- 10129	Flare inlet measurement. Since the flow is recorded at NTP, the temperature is not used in calculations, but is recorded to be complete
TIRCAH 81.24	T_{flare}	Thermocouple	K- 10129	Flare measurement
A 151	$fv_{CH4,FG,h}$	Flue Gas Analyser	K- 10129	Flare outlet measurement
	$t_{O2,h}$			
FIR 61.5	$LFG_{total, y}$	Flow Meter	K- 10129	Generator inlet measurement

3.c. <u>Data collection</u>

All the monitored parameters are recorded by Memograph RSG10 (PLC) on site and stored in the Site Manager's computer.

The data is transferred to the computer at Gafsa's headquarters controlled by the JI Monitoring Manager for QA/QC and storage. This will then be sent over the internet (i.e. email) on a weekly basis to the QA/QC Manager for storage on the CCM server. The files at both Gafsa's and CCM's computers are archived periodically.

3.d. <u>Calculation formula</u>

The monitoring data collected will be used to calculate the project's emission reductions. The general formula for emission reductions of landfill gas projects is listed as follow:

Formula from ACM0001:

$ER_y = (MD_{project,y} – MD_{reg,y})*GWP_{CH4} + (EL_y*CEF_{electricity,y}) – (ET*CEF_{thermal,y})$

Where :

ER_y is emission reductions by the project in year "y" (tCO_2e)

$MD_{project,y}$ is amount of methane destroyed/combusted in year "y" (tCH_4)
$MD_{reg,y}$ is amount of methane destroyed/combusted in year "y" in the absence of the project activity (tCH_4)
GWP_{CH4} is approved Global Warming Potential value for methane, 21 tCO_2e/ tCH_4
EL_y is net quantity of electricity exported during year "y" (MWh)
$CEF_{electricity,y}$ is CO_2 emissions intensity of the electricity displaced (tCO_2e/MWh)
ET is incremental quantity of fossil fuel, defined as difference of fossil fuel used in the baseline and fossil use during project, for energy requirement on site under project activity during the year "y "(TJ)
$CEF_{thermal,y}$ is CO_2 emissions intensity of the thermal energy displaced (tCO_2e/TJ)

<u>Emission Reductions from Electricity Exported ($EL_y*CEF_{electricity,}$):</u>

Since the project activity is not currently importing or exporting, the net quantity of electricity exported (El_y) is zero and the "$EL_y*CEF_{electricity,y}$" part of the equation is therefore zero.

<u>Amount of methane destroyed/combusted in absence of the project activity ($MD_{reg,\ y}$):</u>

Furthermore, there are currently no regulatory or contractual requirements relating to landfill gas projects in Ukraine nor are any planned in the near future. As well, no systems for landfill gas recovery or combustion were present at the site before project implementation. Thus there is no "Adjustment factor" and AF=0. Based on this $MD_{reg,\ y} = 0$ as there was no methane destroyed/combusted in year "y" in the absence of project activity.

<u>As a result, the emissions reduction formula will take the following form:</u>

$$ER_y = (MD_{project,y}*GWP_{CH4}) - (ET*CEF_{thermal,y})$$

This is the final form of the formula and was used to calculate the emission reductions from the project activity.

To calculate $MD_{project,y}$, the following steps in the Annex 13 EB28 *Tool to determine project emissions from flaring gases containing methane* were followed.

STEP 1: Determination of the mass flow rate of the residual gas that is flared
STEP 2: Determination of the mass fraction of carbon, hydrogen, oxygen and nitrogen in the residual gas
STEP 3: Determination of the volumetric flow rate of the exhaust gas on a dry basis
STEP 4: Determination of methane mass flow rate of the exhaust gas on a dry basis
STEP 5: Determination of methane mass flow rate of the residual gas on a dry basis
STEP 6: Determination of the hourly flare efficiency
STEP 7: Calculation of annual project emissions from flaring based on measured hourly values or based on default flare efficiencies.

The Tool offers two options for determining the flare efficiency for the enclosed flare. Option 1 is ("Default Flare Efficiency Approach") is to apply the default default efficiency factors. Refer to Section 4c for details. Option 2 ("Continuous Monitoring Approach") is to continuously monitor all the required parameters to calculate the flare efficiency in in Step 6 described above. In Step 7, the flare efficiency (in %) is applied to the mass of residual CH4 to calculate the mass of CH_4 destroyed. The rest of the residual CH4 (residual CH_4 not destroyed = total residual CH_4 – residual CH_4 destroyed) was determined as the project emissions from flaring ($PE_{flare,y}$).

As described in the registered PDD, Option 2 or the Continuous Monitoring Approach would be used where possible; otherwise, Option 1 will be used.

For the first periodic verification, due to an initial problem with the monitoring of O_2% in the exhaust gas, it has been decided the "Default Approach" specified in the Annex 13 EB 28 Tool would be used to determine the flare efficiency rather than the "Continuous Monitoring Approach". Therefore, the flare efficiency will be 90%, 50%, or 0% depending on the exhaust gas temperature measured by the thermocouple and recorded by the Memograph.

To calculate the emission from the gasoline consumption (i.e., the startup fuel), the consumption of gasoline, measured in litres, will be converted into terajoules (TJ) by the energy content (TJ/Litre) of gasoline and multiplied by the corresponding CO_2 emission factor ($CEF_{thermal,y}$) to calculate the CO_2 emissions. The emission factor was derived from *Revised 1996 IPCC Guidelines*[1] and the energy content was derived from CANMET[2].

Note that the startup fuel, gasoline, is no longer needed for the operation since October of 2009; hence, zero emissions in 2010.

3. MONITORING RESULTS

4.a. Emissions reduction

The calculated emission reductions amount to **55,275tCO_{2eq} for the period 2008-06-01 to 2010-03-31**. A detail breakdown of the ERU results is included in Annex 1 of this report.

4.b. Monitoring period

This is the first monitoring report of this project, it covers the period 2008-06-01 to 2010-03-31.

4.c. Presentation of monitoring results

All the project data for this monitoring period was presented in Excel workbooks. These include:

- **ERU Calculation Workbook:**

The file name of the ERU workbooks is "YaltaERUCalcYYYYMMDD-YYYYMMDD" for Yalta and "AlushtaERUCalcYYYYMMDD-YYYYMMDD". Each file contains one week of data. The first "YYYYMMDD" in the file name represents the starting date of the week and the second "YYYYMMDD" in the file name represents the ending date of the week.

[1] Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories - Workbook Vol. 2 Page 1.1

[2] CANMET Energy Diversification Research Laboratory

The raw data is transferred from the raw data file to the “ResidualGasData” and “ExhaustGasData” worksheets of the Yalta and Alushta workbooks accordingly. The residual gas data and exhaust gas data are linked to the “A” worksheet designed to organize the data and convert them in the correct units for application to the calculation formula described in Section 3d above. The calculation formulae have been input into the “Calc sheet” worksheet, which is linked to data in “A” worksheets and constants in “B” worksheets.

For the first periodic verification, it has been decided the “Default Approach” specified in the Annex 13 EB 28 Tool would be used to determine the flare efficiency rather than the “Continuous Monitoring Approach”. Therefore, the flare efficiency will be 90%, 50%, or 0% depending on the exhaust gas temperature measured by the thermocouple and recorded by the Memograph.

The flare efficiency is:

- 0% if the temperature in the exhaust gas of the flare (Tflare) is below 500 °C for more than 20 minutes during the hour h .
- 50%, if the temperature in the exhaust gas of the flare (Tflare) is above 500 °C for more than 40 minutes during the hour h, but the manufacturer’s specifications on proper operation of the flare are not met at any point in time during the hour h.
- 90%, if the temperature in the exhaust gas of the flare (Tflare) is above 500 °C for more than 40 minutes during the hour h and the manufacturer’s specifications on proper operation of the flare are met continuously during the hour h.

In accordance with the manufacturer’s specifications, the flare efficiency is above 99% when the exhaust temperature is above 700^{o}C. To be conservative, this temperature (700^{o}C) instead of lower standard temperature (500^{o}C) specified in the Annex 13 EB28 Tool was used to check whether the flare meets the requirement of the Tool and the manufacturer’s specification.

Two EXCEL Macros have been used to automatically check whether the exhaust temperature meets the criteria.

First, the “temperaturecheck700C1min” Macro was used to check whether the temperature is below 700^{o}C (i.e., the lower temperature range specified by manufacturer) at any point in time during the hour. This Macro was used to run the data in “TempCheck700C1min” worksheet. If the temperature is below 700^{o}C at any point in time during the hour, an indicator of “2” will appear in column K; otherwise, the indicator will be “0”.

Second, the “temperaturecheck700C20min” Macro was used to check whether the temperature is below 700^{o}C (i.e., the lower temperature range specified by manufacturer) for more than 20 minutes during the hour. This Macro was used to run the data in “TempCheck700C20min” worksheet. If the temperature is below 700^{o}C for more than 20 minutes during the hour, an indicator of “3” will appear in column K; otherwise, the indicator will be “0”.

The “0”, “2”, and “3” indicators are linked to column Z of “Calc sheet” worksheet. The formula in column Z will output the flare efficiency depending on the indicator:

- Indicator “0” = 90% flare efficiency

- Indicator “2” = 50% flare efficiency
- Indicator “3” = 0% flare efficiency

The flare efficiency is applied to the mass flow rate of CH_4 in the residual gas in the hour h (column Y) to calculate the emission reductions by flaring ($MD_{project,y}$)in column AB. The difference between 100% and the flare efficiency (i.e., 100% minus flare efficiency) is applied to the mass flow rate of CH_4 in the residual gas in the hour h (column Y) to calculate the project emissions from flaring in column AA.

- **ERU Summary Workbook:**

The file name of the ERU summary workbook is “ERU_DefApp_YYYYMMDD”. It contains the following worksheets:

- ERU_Yalta
- ERU_Alushta
- ERU_Total
- EF

The “ERU_Yalta” and “ERU_Alushta” worksheets contains the weekly results of project emissions and emission reductions calculated in the ERU Calculation Workbook. The worksheets also contain the gasoline consumption (i.e., startup fuel) recorded by the site operator and the associated CO_2 emissions calculated by applying the corresponding energy content factor and emission factor (refer to Section 3.d). The results are also summarized by month and year.

The emission reductions from flaring and the project emissions from fuel consumption as well as the net emission reductions are summarized in the “ERU_Total” worksheet. The results for 2008 (partial year), 2009, 2010 (partial year), and the total for the entire monitoring period are presented in the table.

The “EF” worksheet shows the source of the energy content and CO_2 emission factor.

Table 1: Parameters monitored

Variable	Description	Unit
$FV_{RG4,h}$	Flow rate	[Nm^3]
$fv_{CH4,h}$	CH_4 residual	%
$fv_{O2,h}$	O_2 residual	%
$fv_{CH4,FG,h}$	CH_4 exhaust	%
$fv_{O2,FG,h}$	O_2 exhaust	%
$fv_{CO2,h}$	CO_2 residual	%
T_{flare}	Exhaust gas temperature	^oC
EL_y	Net electricity export	kWh

Table 2: Constants used in emission reductions calculations

Parameter	Value
Number of atoms of element j in component i, depending on molecular structure - NA i,j	-
Global Warming Potential value for methane (tCO_2e/tCH_4)	21
Density of methane gas at normal conditions - ρCH_4,n - (kg/m^3)	0.716
Molecular mass of methane - $MMCH_4$ - (kg/kmol)	16.04
Molecular mass of carbon monoxide - MMCO - (kg/kmol)	28.01
Molecular mass of carbon dioxide - $MMCO_2$ - (kg/kmol)	44.01
Molecular mass of oxygen - MMO_2 - (kg/kmol)	32.00
Molecular mass of hydrogen - MMH_2 - (kg/kmol)	2.02
Molecular mass of nitrogen - MMN_2 - (kg/kmol)	28.02
Atomic mass of carbon - AMC - (kg/kmol)	12.00
Atomic mass of oxygen - AM0 - (kg/kmol)	16.00
Atomic mass of hydrogen - AMH - (kg/kmol)	1.01
Atomic mass of nitrogen - AMN - (kg/kmol)	14.01
Atmospheric pressure at normal conditions - Pn - (Pa)	101,325
Universal ideal gas constant - RU - ($Pa.m^3/kmol.K$)	8,314.472
Temperature at normal conditions - Tn - (K)	273.15
O2 volumetric fraction of air - MFO_2	0.21
Volume of one mole of any ideal gas at normal temperature and pressure - MVn - ($m^3/kmol$)	22.414

5. QUALITY ASSURANCE AND CONTROL MEASURES

Calibration and Maintenance of the monitoring equipment

All the monitoring data has been quality controlled for the following measures:

1. Certification/License provided by the manufacturers of instrumentation to accredited standard
2. Calibration certificates for instrumentation standard
3. JI database archives management regulation

The calibrations were performed by independent, external accredited laboratories or by the instruments manufacturers if applied.

Maintenance work was performed by Gafsa-Skhid and detailed in the weekly reports held in the dataroom.

Table 3: Calibration and Maintenance Schedule

Equipment ID	Description	Maintenance		Calibration	
		Frequency	Notes	Frequency	Notes
A 141	Gas Analyser	Weekly	Check function control for measuring gas cooler, condensate pump and cabinet fan; exchange filter in measuring gas filter	Weekly	On-site using recommended calibration gas mixture with max. pressure 300hPa Before calibration should be carried out zeroing. For zeroing, the analyser has to be flushed with nitrogen (N2) or opposite calibration gas
		Monthly	Check function control for measuring gas pump; Clean filter mat in Cabinet fan		
		Half Yearly	Dismount heat exchanger and clean measuring gas cooler; change hose in condensate pump; check function control for solenoid valve		
		Yearly	Change measuring gas pump; Pressure test entire system with 50 hPa (testing time 50 minutes); check function control for entire system; dismount and clean deflagration arrester		
A151	Flue Gas Analyzer	Weekly		Weekly	On-site using recommended calibration gas mixture with max. pressure 300hPa Before calibration should be carried out zeroing. For zeroing, the analyser has to be flushed with nitrogen (N2) or opposite calibration gas
		Bi-Monthly	Testing for gas leakage should be performed always immediately after any repair or replacement of gasline components is performed		
		2.5 Years	Check/replace electrochemical oxygen sensor		
PI 61.2	Pressure Transmitter	None		None	
TI 61.1	Temperature Transmitter	None		None	
FIR 61.5	Flow Meter	Weekly	Lubrication of system	Every 2 years	On-site
		Half yearly	Check mechanical smooth running		
		Yearly	Spin test		

Equipment ID	Description	Maintenance		Calibration	
		Frequency	Notes	Frequency	Notes
TIRCAH 81.24	Thermocouple	None		None	

Table 4: Calibration work performed

Yalta

Description	ID	Calibration		
		Frequency	Date of last calibration	Scheduled Date of next calibration
Gas Analyser	A141	Weekly	02.04.2010	10.04.2010
Flue Gas Analyser	A151	Weekly	02.04.2010	10.04.2010
Pressure Transmitter	PI 61.2	Every 2 Years	22.01.2010	22.01.2012
Temperature Transmitter	TI 61.1	Every 2 Years	22.01.2010	22.01.2012
Flow Meter	FIR 61.5	Every 2 Years	22.01.2010	22.01.2012

Alushta

Description	ID	Calibration		
		Frequency	Date of last calibration	Scheduled Date of next calibration
Gas Analyser	A141	Weekly	02.04.2010	10.04.2010
Flue Gas Analyser	A151	Weekly	02.04.2010	10.04.2010
Pressure Transmitter	PIR 61.5	Every 2 Years	22.01.2010	22.01.2012
Temperature Transmitter	TIR 61.5	Every 2 Years	22.01.2010	22.01.2012
Flow Meter	FIR 61.5	Every 2 Years	22.01.2010	22.01.2012

Annex 1

SUMMARY OF THE EMISSION REDUCTIONS DURING THE MONITORING PERIOD
2009 June 1 to 2010 March 31
Yalta Alushta Landfill Gas Project

As explained in Section 3d, the equation for calculating the net emission reductions is:
$ER_y = (MD_{project,y} * GWP_{CH4}) – (ET * CEF_{thermal,y})$

Part 1 of the Equation: Emission Reductions from Flaring ($MD_{project,y} * GWP_{CH4}$) in tonnes of CO_{2eq}

Month	Year					
	2008		2009		2010	
	Yalta	Alushta	Yalta	Alushta	Yalta	Alushta
January	0	0	2,460	1,095	1,304	1,331
February	0	0	3,645	1,818	554	1,584
March	0	0	3,860	2,070	490	1,581
April	0	0	2,344	1,356	0	0
May	0	0	3,153	2,120	0	0
June	0	0	2,674	1,722	0	0
July	0	0	2,079	484	0	0
August	0	0	2,311	1,518	0	0
September	0	116	1,678	1,558	0	0
October	0	292	1,677	1,132	0	0
November	0	708	1,058	552	0	0
December	698	1,257	1,602	1,396	0	0
Yearly ER Total	**698**	**2,373**	**28,540**	**16,821**	**2,348**	**4,496**
Yearly ER Total	**3,07**		**45,362**		**6,845**	
Total ERs (tonnes of CO_{2eq})	**55,277**					

Part 2 of the Equation: Emission from Gasoline Consumption ($ET*CEF_{thermal,y}$)

The consumption of gasoline, measured in litres, will be converted into terajoules (TJ) by the energy content (TJ/Litre) of gasoline and multiplied by the corresponding CO_2 emission factor ($CEF_{thermal,y}$) to calculate the CO_2 emissions. The emission factor was derived from *Revised 1996 IPCC Guidelines*[3] and the energy content was derived from CANMET[4].

Note that the startup fuel, gasoline, is no longer needed for the operation since October of 2009; hence, zero emissions in 2010.

Yalta

	Gasoline Use		CO_2 Emissions
Year	**Litre**	**TJ**	**tonnes**
2008 (Partial Year)	13	0.0005	0.03
2009 Total (Full Year)	384	0.0133	0.92
2010 Total (Partial Year)	0	0.0000	0.00
TOTAL	397	0.0138	**0.95**

Alushta

	Gasoline Use		CO_2 Emissions
Year	**Litre**	**TJ**	**tonnes**
2008 (Partial Year)	57	0.00196	0.14
2009 Total (Full Year)	112	0.00389	0.27
2010 Total (Partial Year)	0	0.00000	0.00
TOTAL	169	0.00585	**0.41**

Total

Year	**Project Emissions From Gasoline Use**
	Tonnes of CO_{2eq}
2008 (Partial Year)	0.17
2009 Total (Full Year)	1.19
2010 Total (Partial Year)	0.00
TOTAL	**1.36**

[3] Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories - Workbook Vol. 2 Page 1.1

[4] CANMET Energy Diversification Research Laboratory

Net Emission Reductions:

Therefore, the net emission reductions (ER_y) during the monitoring period (2008-06-01 – 2010-03-31) are **55,275 tonnes CO_{2eq}**:

Year	Emission Reductions From Flaring	Project Emissions From Gasoline Use	Net Emission Reductions
	$MD_{project,y}*GWP_{CH4}$	$ET*CEF_{thermal,y}$	ER_y
	Tonnes CO_{2eq}		
2008 (Partial Year)	3,079.03	0.17	3,070.76
2009 Total (Full Year)	45,361.58	1.19	45,360.39
2010 Total (Partial Year)	6,844.53	0.00	6,844.53
TOTAL	55,277.04	1.36	**55,275**

Yalta – Monthly Average of Monitored Variable

PID Code	A 141	A 151	FIR 61.5	A 151	PIR 61.5	TIR 61.5	TIRCAN 81.24
Parameter	fv $_{CH4,h}$	fv $_{CH4,FG,h}$	FV $_{RG,h}$	t $_{O2,h}$	P	T	T flare
Description	Residual CH4%	Exhaust Gas CH4%	Residual Gas Flow Rate	Exhaust Gas CO2%	Pressure of LFG	Temp of LFG	Temp of Exhaust
Unit	%	%	Nm3/h	%	mbar	°C	°C
2008-11	34.20	0.01	0.80	19.73	933.85	7.77	14.27
2008-12	50.84	0.03	672.60	7.35	1,035.94	27.51	982.09
2009-01	50.39	0.03	849.17	0.88	1,040.23	33.20	998.58
2009-02	53.86	0.03	799.32	6.93	1,033.75	32.71	923.71
2009-03	55.82	0.07	793.48	11.63	1,031.55	34.35	986.99
2009-04	43.28	0.09	699.64	12.08	973.75	44.51	1,038.47
2009-05	53.07	0.09	780.41	11.40	969.45	54.99	1,024.63
2009-06	52.63	0.09	798.16	10.84	975.79	61.96	1,017.64
2009-07	54.22	0.14	717.46	7.96	984.10	62.68	958.18
2009-08	44.25	0.12	787.87	14.47	971.71	64.51	983.73
2009-09	38.20	0.12	761.52	12.16	972.35	58.23	972.51
2009-10	40.46	0.12	733.90	9.34	976.83	53.94	993.03
2009-11	41.80	0.16	606.18	9.15	1,035.95	47.83	930.40
2009-12	44.80	0.14	506.22	16.59	1,139.74	51.65	1,012.49
2010-01	41.97	0.14	483.30	16.60	1,160.67	47.72	1,055.07
2010-02	41.59	0.15	521.08	16.44	1,170.24	55.05	970.21
2010-03	40.60	0.15	511.11	15.73	1,150.47	59.28	898.84

Alushta – Monthly Average of Monitored Variable

PID Code	A 141	A 151	FIR 61.5	A 151	PIR 61.5	TIR 61.5	TIRCAN 81.24
Parameter	fv $_{CH4,h}$	fv $_{CH4,FG,h}$	FV $_{RG,h}$	t $_{O2,h}$	P	T	T flare
Description	Residual CH4%	Exhaust Gas CH4%	Residual Gas Flow Rate	Exhaust Gas CO2%	Pressure of LFG	Temp of LFG	Temp of Exhaust
Unit	%	%	Nm3/h	%	mbar	°C	°C
2008-09	35.17	0.03	393.75	9.59	1,045.83	49.94	746.27
2008-10	36.24	0.01	249.32	10.22	1,168.27	47.33	859.41
2008-11	36.20	0.02	395.36	9.81	1,053.74	37.88	819.20
2008-12	37.43	0.04	461.02	15.95	1,046.50	32.67	788.28
2009-01	38.77	0.08	412.14	11.43	1,041.47	30.02	832.34
2009-02	40.36	0.04	516.17	7.86	1,046.93	33.62	861.39
2009-03	42.02	0.04	512.50	14.63	1,047.23	34.61	935.36
2009-04	47.81	0.04	448.33	12.17	1,039.36	38.15	1,043.36
2009-05	47.60	0.05	494.05	6.48	1,048.37	44.03	1,007.15
2009-06	49.10	0.01	508.31	14.17	1,071.59	51.75	1,060.17
2009-07	52.71	0.00	541.10	18.26	1,082.99	53.56	1,055.55
2009-08	46.45	0.00	503.65	18.06	1,055.05	50.99	1,033.21
2009-09	38.32	0.00	499.97	17.93	1,046.67	47.88	1,007.35
2009-10	36.38	0.00	480.15	18.49	1,043.32	44.70	953.17
2009-11	40.34	0.00	438.64	18.25	1,041.75	41.73	1,012.78
2009-12	38.98	0.00	440.68	17.62	1,035.38	46.67	954.31
2010-01	38.46	0.00	454.28	17.41	1,039.74	41.68	997.95
2010-02	39.78	0.00	485.41	4.46	1,036.80	46.10	1,004.81
2010-03	40.04	0.00	463.58	1.49	1,031.42	45.98	746.27