



CDM MONITORING REPORT FORM

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**CLEAN DEVELOPMENT MECHANISM
CDM MONITORING REPORT FROM THE *BANDEIRANTES LANDFILL GAS TO
ENERGY PROJECT (BLFGE)***

MONITORING PERIOD:
01 OCTOBER, 2006 TO 31 DECEMBER, 2006

3RD VERIFICATION – VERSION 1
05 JANUARY 2007

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Annex 1: Analysis of Methane Content in the exhaust gas.

Initial remark (referring to Decision 17/CP.7, Annex H, paragraph 54, 56, 58 and 60)

The monitoring plan contained in the registered project design document is to be implemented by the project participants and the monitoring report shall be written in accordance with this registered monitoring plan.

The monitoring plan shall be based on a previously approved monitoring methodology or a new methodology.

The implementation of the registered monitoring plan and its revision, as applicable, shall be a condition for verification, certification and issuance of CERs.

SECTION A. General project activity information**A.1 Title of the project activity:**

Bandeirantes Landfill Gas to Energy Project (BLFGE)

A.2. CDM registration number: 0164**A.3. Short description of the project activity:**

BLFGE is a project designed to explore the landfill gas produced in Bandeirantes landfill, one of the biggest landfills in Brazil. This landfill is located in the metropolitan region of São Paulo, Brazil's biggest city and financial center of the country. With an estimated population of around 10 million citizens in 2000, São Paulo generates nearly 15.000 tons of waste daily. BLFGE's goal is to explore the gas produced in Bandeirantes landfill, using it to generate electricity.

A.3.1. Real Project Implementation

Bandeirantes landfill is divided into 5 cells, named AS-1, AS-2, AS-3, AS-4 and AS-5. The former 3 are the oldest ones, which operated from 1978 until 1995. BLFGE has since its start been extracting gas from the newest cells, where there is still waste being disposed. Two main units can be detached: the degassing installations and the power plant.

The degassing installations are responsible for extracting the landfill gas from the landfill and transport it to the gas engines in the power plant. During the transportation, the gas goes through a treatment to allow its use as fuel for energy generation. Other functions of the degassing installations are: drying landfill gas by gas coolers; and measuring and analyzing the quantity and quality of the landfill gas for safety, process and operating purposes.

The landfill gas cools down when transported from the landfill, resulting in a condensate. This is drained to condensate shafts, placed nearby the gas pipes. Once in the degassing installations, the landfill gas has to be cooled again to remove moisture. This is a very important step in the gas treatment process, since the condensate, which contains silicium components, could block the

gas pipes and also damage the gas engines, due to the silicium. After this step, the gas is heated again through a second heat exchanger, or economizer, to a temperature of around 25°C, far enough from the dew point of 4°C to avoid further condensation.

Considering demisting is fundamental for the energy generation, as per the reasons mentioned in the previous paragraph, a demister has been installed for extra-safety reasons. The demister is a stainless steel high density filter which separates liquid particles (small amounts of condensate) from the landfill gas. This liquid is to be drained off to a condensate shaft as well.

The blowers are used for transportation of the landfill gas from the landfill to the gas engines, under correct suction and pre-pressure. Capacity and pressure are adjusted through frequency controlled electromotors. Moreover, the blowers are equipped with all the necessary safety equipment, including a noise reducing housing.

On the pressure side of the degassing installation, all kinds of gas analyzing and gas measuring instruments are present. These instruments are very important for safety, process and operating purposes. After the described treatment, analyzing and measurement, the landfill gas is transported as a fuel to the gas engines. These drive electrical generators in order to generate electrical power. An occasional surplus of the landfill gas can be burned off by the flares.

The whole process is controlled by an electrical control system. This control system is provided with a PLC (Programmable Logical Controller). All the measured process signals are processed by the PLC to output signals for the gas-coolers, blowers, flares and gas-engines. Also the system counts on a SCADA system (process visualization on a personal computer). With this system it is possible to control and monitor the installation at a distance, including through the internet.

For electricity generation, a total of 24 Caterpillar engines, nominal capacity of 925 kW, model 3516 A were installed. They will burn the gas and generate energy, which is to be sent to Eletropaulo's – the electricity distributor supplying São Paulo metropolitan region – grid. This electricity will in fact not be commercialized directly; it will supply Unibanco's branches over São Paulo state.

A.3.2. Changes against the PDD

The changes made against the presented in the registered PDD are:

- periodical monitoring of methane content in the exhaust flare gas, made by a specialized company on gas analysis;
- installation of two new flow-meters used to measure the gas sent to the power house.

A.4. Monitoring period:

- 01/10/2006 to 31/12/2006

A.5. Methodology applied to the project activity (incl. version number):**A.5.1. Baseline methodology:**

The baseline applied to this project activity is ACM0001 – version 2: “*Consolidated baseline methodology for landfill gas project activities*”.

A.5.2. Monitoring methodology:

The monitoring methodology applied to this project activity is ACM0001 – version 2: “*Consolidated monitoring methodology for landfill gas project activities*”.

A.6. Changes since last verification:

The major changes from the last verification are the installation of a new flow-meter, in order to measure the amount of biogas sent to the power-house, as mentioned in A.3.2.

A.10. Person(s) responsible for the preparation and submission of the monitoring report:

This monitoring report was developed by:

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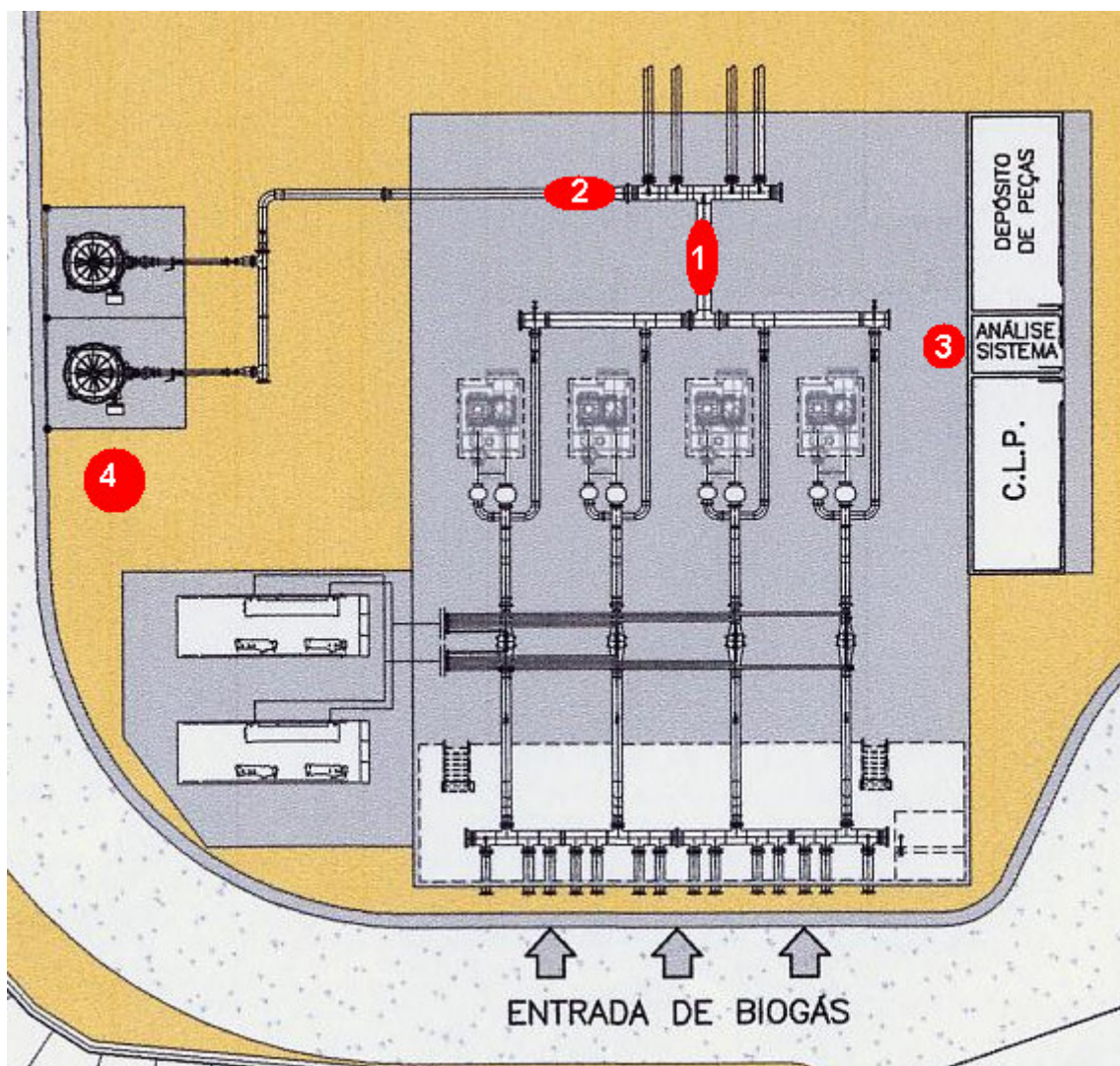
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SECTION B. Key monitoring activities according to the monitoring plan for the monitoring period stated in A.4. (referring to Decision 17/CP.7, Annex H, paragraph 53 (a) – (d) on data collection and archiving)**B.1. Monitoring equipment:**

The following equipment are used to monitor the operation of the project and to monitor the Emission Reduction

a) Gas Plant



Number	Type of Variable	Type of Equipment	Manufacturer	Model	Error (+/- %)
1-2	Gas Flow	Flow Meter	Instromet	SM-RI X K	0,600
1-2	Temperature	Temperature Transmitter	Instromet	model 333	0,010
1-2	Pressure	Pressure Transmitter	Instromet	model 333	0,010
3	LFG Concentration	Analyser Panel	Emerson	BINOS 100	1,000
4	Methane Concentration	Periodical Analysis	-	-	-

b) Power House

Type of Variable	Type of Equipment	Manufacturer	Model	Error (+/- %)
Electricity Dispatched	Electricity Meter	Merlin Gerin	0011001426 - CM 4000 0011001414 - CM 4000	0,04

B.1.1. Involvement of Third Parties:

BFLGE has two third parties involved:

a) Specialized company on gas analysis

As the analysis of methane concentration in the exhaust gas is made periodically, Biogás hired TASQA, a national and certified laboratory, to develop the analysis. The collection was made on 30/11/2006

b) Sotreq

Sotreq is the company that produces the electricity in ICEs, using the gas from the landfill. Sotreq is responsible to monitor the electricity displaced to the local grid. The amount of electricity dispatched is monitored by Sotreq's PLC and by Biogás's PLC.

B.2. Data collection (accumulated data for the whole monitoring period):

B.2.1. List of fixed default values:

Global Warming Potential of CH_4 (GWP_{CH_4}) = 21 tCO₂e/tCH₄;

Emission Factor of the S-SE-CO Brazilian Grid (EF) = 0,2677 tCO₂e/MWh;

Methane Destruction in the Baseline = 20% of total gas collected;

Density of Methane, at STP (D_{CH_4}) = 0,0007168 tons/m³

B.2.2. List of variables:

$Q_{biogas, collected}$ = amount of biogas collected from the landfill (Nm³)

$Q_{biogas, flares}$ = amount of biogas sent to flares (Nm³)

$Q_{biogas, power house}$ = amount of biogas sent to the power house (Nm³)

$\%_{CH_4}$ = percentage of methane in the biogas (% volume);

EG_y = amount of electricity dispatched to the grid (MWh);

FE = Flare Efficiency (calculated using data from methane sent to flares and methane content in the exhaust gas)

B.2.3. Data concerning GHG emissions by sources of the project activity (referring to paragraph 53(a)):

As BLFGE does not consume electricity from the grid, $PE_y = 0$.

B.2.4. Data concerning GHG emissions by sources of the baseline (referring to paragraph 53(b)):

The following table presents the collected data from the period 01/10/2006 to 31/12/2006.



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DAY	COLLECTING SYSTEM						FLARING SYSTEM				ELETRICITY GENERATION		
	LFG Collected (Nm3)	Temperature (°C)	Temperature (K)	Pressure (mbar)	Methane (%)	Methane Collected (N.m³)	LFG to Flares (N.m³)	Methane sent to Flares (N.m³)	Flare Efficiency (%)	Methne Destroyed (Nm³)	Biogás to electricity (Nm³)	Methane sent to eletricity (Nm3/day)	Eletricity Exported (MWh)
1/10/2006	269.241	46,1667	319,3167	189,9197	47,5563	128.041,0576	586	278,6799	99,9986	278,6759	268.655	127.762,3777	411,2100
2/10/2006	267.837	47,0000	320,1500	189,7689	47,5665	127.400,6866	435	206,9142	99,9986	206,9113	267.402	127.193,7723	408,3000
3/10/2006	267.735	47,0000	320,1500	189,2825	47,3087	126.661,9479	703	332,5801	99,9986	332,5754	267.032	126.329,3677	396,2600
4/10/2006	268.979	47,2083	320,3583	190,1480	47,5768	127.971,6008	7.384	3.513,0709	99,9986	3.513,0217	261.595	124.458,5299	392,9900
5/10/2006	269.753	45,8333	318,9833	188,4960	48,8903	131.883,0509	11.129	5.441,0014	99,9986	5.440,9252	258.624	126.442,0494	410,1400
6/10/2006	254.421	46,5833	319,7333	189,6435	47,6249	121.167,7468	884	421,0041	99,9986	420,9982	253.537	120.746,7427	369,1000
7/10/2006	270.399	46,5833	319,7333	189,8926	47,6856	128.941,3855	15.944	7.602,9920	99,9986	7.602,8855	254.455	121.338,3934	409,7600
8/10/2006	267.850	46,1667	319,3167	190,0592	47,8074	128.052,1209	3.336	1.594,8548	99,9986	1.594,8324	264.514	126.457,2660	409,0600
9/10/2006	268.292	47,6667	320,8167	190,1261	47,5413	127.549,5045	1.514	719,7752	99,9986	719,7651	266.778	126.829,7293	410,6500
10/10/2006	277.391	48,7826	321,9326	189,8332	47,8088	132.617,3084	272	130,0399	99,9986	130,0380	277.119	132.487,2684	406,3900
11/10/2006	279.954	48,7917	321,9417	189,9408	47,3496	132.557,0991	11.085	5.248,7031	99,9986	5.248,6296	268.869	127.308,3960	416,5200
12/10/2006	285.230	48,0000	321,1500	190,0017	47,2955	134.900,9546	8.977	4.245,7170	99,9986	4.245,6575	276.253	130.655,2376	429,8800
13/10/2006	281.376	48,7826	321,9326	189,9290	47,4664	133.559,0576	2.989	1.418,7706	99,9986	1.418,7507	278.387	132.140,2869	425,9800
14/10/2006	278.627	46,7500	319,9000	193,1854	49,6348	138.295,9541	631	313,1955	99,9986	313,1911	277.996	137.982,7586	416,4200
15/10/2006	254.650	48,8696	322,0196	189,8756	47,5028	120.965,8802	67.374	32.004,5364	99,9986	32.004,0883	187.276	88.961,3437	291,2700
16/10/2006	280.412	46,6667	319,8167	190,0471	47,3651	132.817,4242	0	0,0000	99,9986	0,0000	280.412	132.817,4242	425,1100
17/10/2006	282.928	45,8636	319,0136	189,8074	47,0838	133.213,2536	242	113,9427	99,9986	113,9411	282.686	133.099,3108	419,6500
18/10/2006	284.539	44,2083	317,3583	189,2009	47,0452	133.861,9416	6.054	2.848,1164	99,9986	2.848,0765	278.485	131.013,8252	428,1800
19/10/2006	280.308	44,7500	317,9000	189,7939	47,2986	132.581,7596	1.261	596,4353	99,9986	596,4269	279.047	131.985,3243	423,8900
20/10/2006	277.150	43,0435	316,1935	190,1575	47,7424	132.318,0616	325	155,1628	99,9986	155,1606	276.825	132.162,8988	418,0400
21/10/2006	269.310	43,6667	316,8167	189,8200	47,8090	128.754,4179	1.070	511,5563	99,9986	511,5491	268.240	128.242,8616	410,5500
22/10/2006	267.754	43,1818	316,3318	189,6205	47,9651	128.428,4738	0	0,0000	99,9986	0,0000	267.754	128.428,4738	405,5900
23/10/2006	265.992	46,5417	319,6917	190,0602	47,0343	125.107,4752	1.139	535,7206	99,9986	535,7130	264.853	124.571,7545	376,3800
24/10/2006	266.704	47,1739	320,3239	189,9876	47,1039	125.627,9854	6.085	2.866,2723	99,9986	2.866,2321	260.619	122.761,7131	398,8400
25/10/2006	266.825	47,8750	321,0250	189,1882	47,1513	125.811,4562	327	154,1847	99,9986	154,1825	266.498	125.657,2714	393,1800
26/10/2006	265.078	46,9167	320,0667	189,8444	46,8493	124.187,1874	1.986	930,4270	99,9986	930,4139	263.092	123.256,7603	391,9600
27/10/2006	265.697	44,2727	317,4227	190,2002	47,2833	125.630,3096	2.140	1.011,8626	99,9986	1.011,8484	263.557	124.618,4469	389,6300
28/10/2006	249.523	42,3478	315,4978	189,8982	48,2350	120.357,4190	2.760	1.331,2860	99,9986	1.331,2673	246.763	119.026,1330	371,6500
29/10/2006	237.480	45,4783	318,6283	190,1965	47,6602	113.183,4429	152	72,4435	99,9986	72,4424	237.328	113.110,9994	357,3300

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DAY	COLLECTING SYSTEM						FLARING SYSTEM				ELETRICITY GENERATION		
	LFG Collected (Nm3)	Temperature (°C)	Temperature (K)	Pressure (mbar)	Methane (%)	Methane Collected (N.m³)	LFG to Flares (N.m³)	Methane sent to Flares (N.m³)	Flare Efficiency (%)	Methne Destroyed (Nm³)	Biogás to electricity (Nm³)	Methane sent to eletricity (Nm3/day)	Eletricity Exported (MWh)
30/10/2006	235.422	48,6818	321,8318	189,8173	46,9390	110.504,7325	524	245,9603	99,9986	245,9568	234.898	110.258,7722	353,9700
31/10/2006	234.521	46,5417	319,6917	190,0405	46,9300	110.060,7053	919	431,2867	99,9986	431,2806	233.602	109.629,4186	344,9400
1/11/2006	251.907	45,7083	318,8583	182,5865	48,6078	122.446,4507	544	264,4264	99,9986	264,4226	251.363	122.182,0243	373,0200
2/11/2006	229.895	47,6962	320,8462	189,5951	47,3056	108.753,2091	8.919	4.219,1864	99,9986	4.219,1273	220.976	104.534,0226	334,9800
3/11/2006	255.710	47,6957	320,8457	189,9515	47,3898	121.180,4575	3.615	1.713,1412	99,9986	1.713,1172	252.095	119.467,3163	378,0500
4/11/2006	252.991	46,9130	320,0630	190,1467	47,0675	119.076,5389	177	83,3094	99,9986	83,3082	252.814	118.993,2294	379,5000
5/11/2006	241.974	49,4167	322,5667	189,7679	47,8171	115.704,9495	0	0,0000	99,9986	0,0000	241.974	115.704,9495	360,1400
6/11/2006	246.997	46,4167	319,5667	188,9050	49,0222	121.083,3633	439	215,2074	99,9986	215,2043	246.558	120.868,1558	364,7700
7/11/2006	233.958	43,2083	316,3583	189,9164	49,1213	114.923,2110	3.995	1.962,3959	99,9986	1.962,3684	229.963	112.960,8151	341,3300
8/11/2006	233.731	42,2917	315,4417	189,9794	47,5445	111.126,2352	0	0,0000	99,9986	0,0000	233.731	111.126,2352	351,0100
9/11/2006	232.945	42,5417	315,6917	189,8040	46,7408	108.880,3565	813	380,0027	99,9986	379,9973	232.132	108.500,3538	346,3400
10/11/2006	233.508	43,2083	316,3583	189,8477	46,1622	107.792,4299	6.200	2.862,0564	99,9986	2.862,0163	227.308	104.930,3735	336,8600
11/11/2006	244.293	42,0000	315,1500	189,6827	46,8203	114.378,7154	303	141,8655	99,9986	141,8635	243.990	114.236,8499	357,6300
12/11/2006	238.283	43,5833	316,7333	190,1315	46,8718	111.687,5311	14.701	6.890,6233	99,9986	6.890,5268	223.582	104.796,9078	327,9400
13/11/2006	241.873	45,7083	318,8583	189,9168	47,3260	114.468,8159	1.352	639,8475	99,9986	639,8385	240.521	113.828,9684	354,5000
14/11/2006	243.427	47,6087	320,7587	189,8182	48,4954	118.050,8973	182	88,2616	99,9986	88,2603	243.245	117.962,6357	365,6600
15/11/2006	237.462	51,0417	324,1917	189,7950	48,6660	115.563,2569	349	169,8443	99,9986	169,8419	237.113	115.393,4125	363,4600
16/11/2006	237.889	50,7083	323,8583	189,8528	49,5941	117.978,9085	608	301,5321	99,9986	301,5278	237.281	117.677,3764	359,4400
17/11/2006	236.632	47,0000	320,1500	189,3407	49,8913	118.058,7810	1.230	613,6629	99,9986	613,6543	235.402	117.445,1180	361,0400
18/11/2006	222.972	47,8696	321,0196	188,8045	50,9327	113.565,6598	3.233	1.646,6541	99,9986	1.646,6310	219.739	111.919,0056	337,5200
19/11/2006	216.296	45,2500	318,4000	189,4462	49,9638	108.069,7008	15.544	7.766,3730	99,9986	7.766,2642	200.752	100.303,3277	312,6100
20/11/2006	233.791	45,1304	318,2804	189,5806	49,4438	115.595,1544	11.102	5.489,2506	99,9986	5.489,1737	222.689	110.105,9037	346,0000
21/11/2006	241.738	48,0909	321,2409	190,0549	50,0071	120.886,1633	261	130,5185	99,9986	130,5166	241.477	120.755,6448	374,0000
22/11/2006	242.998	46,4762	319,6262	190,3047	50,2891	122.201,5072	0	0,0000	99,9986	0,0000	242.998	122.201,5072	381,3400
23/11/2006	245.804	47,3913	320,5413	189,8212	50,4121	123.914,9582	449	226,3503	99,9986	226,3471	245.355	123.688,6079	385,4100
24/11/2006	247.931	48,0870	321,2370	189,7416	50,4171	124.999,6202	2.278	1.148,5015	99,9986	1.148,4854	245.653	123.851,1186	385,4900
25/11/2006	253.657	47,0909	320,2409	189,3347	50,6504	128.478,2851	240	121,5609	99,9986	121,5591	253.417	128.356,7241	397,7900
26/11/2006	253.209	48,3333	321,4833	189,7783	50,7562	128.519,2664	113	57,3545	99,9986	57,3536	253.096	128.461,9119	401,7300
27/11/2006	251.091	47,7391	320,8891	189,9622	50,0759	125.736,0780	3.268	1.636,4804	99,9986	1.636,4574	247.823	124.099,5976	393,1500

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	LFG Collected (Nm3)	Temperature (°C)	Temperature (K)	Pressure (mbar)	Methane (%)	Methane Collected (N.m³)	LFG to Flares (N.m³)	Methane sent to Flares (N.m³)	Flare Efficiency (%)	Methne Destroyed (Nm³)	Biogás to electricity (Nm³)	Methane sent to eletricity (Nm3/day)	Eletricity Exported (MWh)
28/11/2006	254.583	48,0833	321,2333	190,0847	49,8295	126.857,4359	5.646	2.813,3735	99,9986	2.813,3341	248.937	124.044,0624	390,1900
29/11/2006	257.870	47,6522	320,8022	189,8963	49,2993	127.128,1049	5.760	2.839,6396	99,9986	2.839,5998	252.110	124.288,4652	391,7900
30/11/2006	267.697	47,2917	320,4417	189,9292	48,8297	130.715,6420	4.565	2.229,0758	99,9986	2.229,0445	263.132	128.486,5662	405,0100
1/12/2006	268.809	47,6250	320,7750	190,0927	49,5028	133.067,9816	1.514	749,4723	99,9961	749,4430	267.295	132.318,5092	408,0000
2/12/2006	258.378	48,7917	321,9417	189,8787	49,3964	127.629,4303	2.026	1.000,7710	99,9961	1.000,7319	256.352	126.628,6593	400,6400
3/12/2006	261.253	47,5000	320,6500	189,9935	48,9122	127.784,5898	0	0,0000	99,9961	0,0000	261.253	127.784,5898	401,0900
4/12/2006	263.909	47,2083	320,3583	189,5905	49,1147	129.618,1136	76	37,3271	99,9961	37,3256	263.833	129.580,7864	402,6600
5/12/2006	263.384	47,3684	320,5184	192,3396	50,4266	132.815,5961	0	0,0000	99,9961	0,0000	263.384	132.815,5961	405,2000
6/12/2006	231.050	47,1250	320,2750	190,0115	49,3223	113.959,1741	0	0,0000	99,9961	0,0000	231.050	113.959,1741	342,7200
7/12/2006	268.344	47,6667	320,8167	189,7931	48,4434	129.994,9572	4.976	2.410,5435	99,9961	2.410,4494	263.368	127.584,4137	411,0900
8/12/2006	268.264	48,2727	321,4227	189,9654	47,3919	127.135,4066	825	390,9831	99,9961	390,9678	267.439	126.744,4234	409,9700
9/12/2006	273.781	47,9545	321,1045	189,3527	48,2249	132.030,6134	2.943	1.419,2588	99,9961	1.419,2034	270.838	130.611,3546	406,3400
10/12/2006	260.866	47,3333	320,4833	187,9925	48,7052	127.055,3070	18.058	8.795,1850	99,9961	8.794,8419	242.808	118.260,1220	366,2600
11/12/2006	258.237	48,0000	321,1500	190,0901	47,2646	122.054,6851	23.981	11.334,5237	99,9961	11.334,0816	234.256	110.720,1613	352,2400
12/12/2006	271.973	48,7083	321,8583	190,1495	47,9077	130.296,0089	17.418	8.344,5631	99,9961	8.344,2376	254.555	121.951,4457	377,9400
13/12/2006	269.618	49,8750	323,0250	189,9274	48,7962	131.563,3385	6.057	2.955,5858	99,9961	2.955,4705	263.561	128.607,7526	395,8900
14/12/2006	267.925	49,3043	322,4543	189,3259	49,3529	132.228,7573	15.437	7.618,6071	99,9961	7.618,3099	252.488	124.610,1501	380,1900
15/12/2006	267.275	50,1250	323,2750	189,8106	49,0500	131.098,3875	11.050	5.420,0250	99,9961	5.419,8136	256.225	125.678,3625	391,4700
16/12/2006	267.328	49,8696	323,0196	189,9909	49,0643	131.162,6119	10.293	5.050,1883	99,9961	5.049,9913	257.035	126.112,4235	390,4800
17/12/2006	264.571	50,6667	323,8167	189,8385	48,9572	129.526,5536	11.730	5.742,6795	99,9961	5.742,4555	252.841	123.783,8740	382,0800
18/12/2006	264.682	50,3913	323,5413	190,1907	49,5168	131.062,0565	7.267	3.598,3858	99,9961	3.598,2454	257.415	127.463,6707	388,4300
19/12/2006	269.118	49,3043	322,4543	189,9612	49,8906	134.264,5849	19.161	9.559,5378	99,9961	9.559,1649	249.957	124.705,0470	382,1900
20/12/2006	269.590	49,5652	322,7152	190,0739	50,9696	137.408,9446	36.855	18.784,8460	99,9961	18.784,1133	232.735	118.624,0985	358,4300
21/12/2006	256.795	51,7917	324,9417	189,8866	49,2335	126.429,1663	39.707	19.549,1458	99,9961	19.548,3833	217.088	106.880,0204	334,0200
22/12/2006	287.874	49,7917	322,9417	187,1304	50,9601	146.700,8782	15.473	7.885,0562	99,9961	7.884,7486	272.401	138.815,8220	416,5400
23/12/2006	265.222	51,0952	324,2452	189,9116	49,1239	130.287,3900	28.323	13.913,3621	99,9961	13.912,8194	236.899	116.374,0278	368,1300
24/12/2006	285.279	51,7917	324,9417	189,6089	49,0028	139.794,6978	28.345	13.889,8436	99,9961	13.889,3018	256.934	125.904,8541	392,1100
25/12/2006	283.668	49,3333	322,4833	189,7669	50,5586	143.418,5694	29.426	14.877,3736	99,9961	14.876,7933	254.242	128.541,1958	385,2300
26/12/2006	272.097	49,8095	322,9595	190,0455	50,7209	138.010,0472	40.544	20.564,2816	99,9961	20.563,4795	231.553	117.445,7655	355,0700

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CDM MONITORING REPORT FORM

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DAY	COLLECTING SYSTEM						FLARING SYSTEM				ELETRICITY GENERATION		
	LFG Collected (Nm3)	Temperature (°C)	Temperature (K)	Pressure (mbar)	Methane (%)	Methane Collected (N.m³)	LFG to Flares (N.m³)	Methane sent to Flares (N.m³)	Flare Efficiency (%)	Methne Destroyed (Nm³)	Biogás to electricity (Nm³)	Methane sent to eletricity (Nm3/day)	Eletricity Exported (MWh)
27/12/2006	281.101	51,8947	325,0447	197,2600	50,9980	143.355,8879	30.447	15.527,3610	99,9961	15.526,7554	250.654	127.828,5269	393,5200
28/12/2006	281.009	52,3182	325,4682	207,3252	50,6938	142.454,1404	27.521	13.951,4406	99,9961	13.950,8964	253.488	128.502,6997	399,4100
29/12/2006	288.849	53,3158	326,4658	209,9122	51,0374	147.421,0195	25.470	12.999,2257	99,9961	12.998,7187	263.379	134.421,7937	413,3300
30/12/2006	289.132	51,9167	325,0667	210,0537	51,6475	149.329,4497	38.895	20.088,2951	99,9961	20.087,5116	250.237	129.241,1545	393,1000
31/12/2006	288.993	51,7826	324,9326	208,4505	52,0155	150.321,1539	24.434	12.709,4672	99,9961	12.708,9715	264.559	137.611,6866	425,5700

Obs: The calculation present two Flare efficiencies: the calculation from 01/10/2006 to 30/11/2006 was made using the analysis from Bioagri (made on 30/08/20026) and the Flare Efficiency from 01/12/2006 to 31/12/2006 was made using the analysis of TASQA.

Both reports are attached on Annex 1.

B.2.5. Data concerning leakage (referring to paragraph 53(c)):

According with ACM0001 – version 02, no leakage needs to be considered.

B.3. Special event log:

As for the table of B.2.4:

- the readings of Biogás is one day ahead, as Sotreq's data are read at 23:59 hs and Biogás measures at 00:00 hs
- the values of *Total Flow* and *Flow to Flares* from 15/10, 27/12 and 29/12 were taken from a manual spreadsheet because PLC did not registered these data.

SECTION C. Quality assurance and quality control measures**C.1. Documented procedures and management plan:**



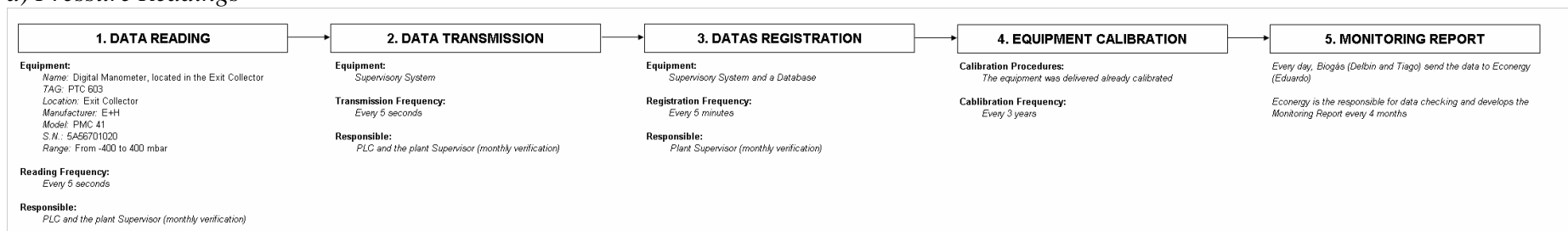
CDM MONITORING REPORT FORM

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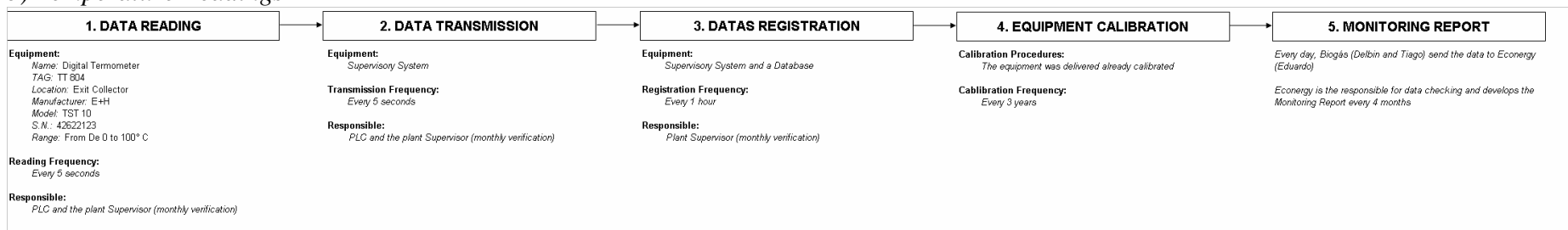
C.1.1. Roles and responsibilities:

The following flow-chart represents the procedures and responsibilities on the monitoring of each parameter:

a) Pressure Readings



b) Temperature Readings



c) Total Flow



CDM MONITORING REPORT FORM

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1. DATA READING	2. DATA TRANSMISSION	3. DATAS REGISTRATION	4. EQUIPMENT CALIBRATION	5. MONITORING REPORT
Equipment: Name: Flow-meter TAG: FIR 100 Location: Exit Collector Manufacturer: Instronet Model: SM-RI-X-K S.N.: 10400626 Range: De 800 a 16000m³/h Reading Frequency: Every 5 seconds Responsible: PLC and the plant Supervisor (monthly verification)	Equipment: Supervisory System Transmission Frequency: Every 5 seconds Responsible: PLC and the plant Supervisor (monthly verification)	Equipment: Supervisory System and a Database Registration Frequency: Once a day, at 00:00:10 Responsible: Plant Supervisor (monthly verification)	Calibration Procedures: The equipment was delivered already calibrated Calibration Frequency: Every 5 years	<i>Every day, Biogás (Delbin and Tiago) send the data to Econergy (Eduardo)</i> <i>Econergy is the responsible for data checking and develops the Monitoring Report every 4 months</i>

d) Flow to Flares

1. DATA READING	2. DATA TRANSMISSION	3. DATAS REGISTRATION	4. EQUIPMENT CALIBRATION	5. MONITORING REPORT
Equipment: Name: Flow-meter TAG: FIR 100 Location: Exit Collector Manufacturer: Instronet Model: SM-RI-X-K S.N.: 10400627 Range: De 320 a 6500m³/h Reading Frequency: Every 5 seconds Responsible: PLC and the plant Supervisor (monthly verification)	Equipment: Supervisory System Transmission Frequency: Every 5 seconds Responsible: PLC and the plant Supervisor (monthly verification)	Equipment: Supervisory System and a Database Registration Frequency: Once a day, at 00:00:10 Responsible: Plant Supervisor (monthly verification)	Calibration Procedures: The equipment was delivered already calibrated Calibration Frequency: Every 5 years	<i>Every day, Biogás (Delbin and Tiago) send the data to Econergy (Eduardo)</i> <i>Econergy is the responsible for data checking and develops the Monitoring Report every 4 months</i>

e) Electricity Dispatched

1. DATA READING	2. DATA TRANSMISSION	3. DATAS REGISTRATION	4. EQUIPMENT CALIBRATION	5. MONITORING REPORT
Equipment: Name: Power Logic (CM4000) TAG: 0011001426 - CM 4000 / 0011001414 - CM 4000 Location: Power House Manufacturer: Merlin Gerin Model: SM-RI-X-K S.N.: 10400627 Range: 240V/300V - 96mA MAX. Reading Frequency: Every 5 seconds Responsible: Sotreq's PLC and the Sotreq's Supervisor (monthly verification)	Equipment: Supervisory System Transmission Frequency: Every 5 seconds Responsible: Sotreq's PLC and the Sotreq's Supervisor (monthly verification)	Equipment: Supervisory System and a Database Registration Frequency: Every 15 minutes Responsible: Sotreq's PLC and the Sotreq's Supervisor (monthly verification)	Calibration Procedures: Automatic calibration Calibration Frequency: Automatic calibration	<i>Every day, Sotreq send the registered data to Biogás</i> <i>Biogás (Delbin and Tiago) send the data to Econergy (Eduardo)</i> <i>Econergy is the responsible for data checking and develops the Monitoring Report every 4 months</i>

f) Methane Concentration

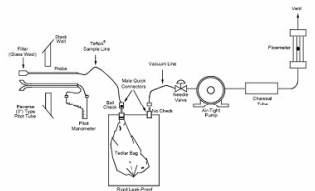


CDM MONITORING REPORT FORM

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1. DATA READING	2. DATA TRANSMISSION	3. DATAS REGISTRATION	4. EQUIPMENT CALIBRATION	5. MONITORING REPORT
Equipment: Name: Gas Analyzer TAG: A-100 Location: Analyzer room Manufacturer: NUK Model: Binós 100-CH4-O2 S.N.: 4002.40 Range: O2 (0 to 21%) CH4 (0 to 100%) Reading Frequency: Every 5 seconds Responsible: PLC and the plant Supervisor (monthly verification)	Equipment: Supervisory System Transmission Frequency: Every 5 seconds Responsible: PLC and the plant Supervisor (monthly verification)	Equipment: Supervisory System and a Database Registration Frequency: Every 5 minutes Responsible: Plant Supervisor (monthly verification)	Calibration Procedures: The equipment was delivered already calibrated Calibration Frequency: Once a week, with a standard gas	Calibration Procedures: Every day, Biogás (Delbin and Tiago) send the data to Econergy (Eduardo) Calibration Frequency: Econergy is the responsible for data checking and develops the Monitoring Report every 4 months

g) Flare Efficiency

1. DATA READING	2. DATA TRANSMISSION	3. DATAS REGISTRATION	4. EQUIPMENT CALIBRATION	5. MONITORING REPORT
Equipment: The monitoring of the Flare Efficiency follows the APEX – EPA 18, according with the plan below:  Reading Frequency: Every 3 months Responsible: Specialized company in gas analysis	Equipment: Electronic Sheets Transmission Frequency: Every three months Responsible: Plant Supervisor (monthly verification)	Equipment: Electronic Sheets Registration Frequency: Every three months Responsible: Plant Supervisor (monthly verification)	Calibration Procedures: The calibration is in charge of the specialized company in gas analysis, certified by INMETRO Calibration Frequency: Determined by the specialized company	Calibration Procedures: Every 4 months, Biogás (Delbin and Tiago) send the data to Econergy (Eduardo) Calibration Frequency: Econergy is the responsible for data checking and develops the Monitoring Report every 4 months

C.1.2. Trainings:

All training was supplied before the project's implementation and as verified during the 1st verification.

SECTION D. Calculation of GHG emission reductions (referring to Decision 17/CP.7, Annex H, paragraph 53 (f) and 59)

D.1. Table providing the formulas used:

A	Total methane destroyed in the flares
B	Total errors of flare's measurements
$C = A \cdot (1-B)$	Total methane corrected destroyed at the flares
D	Total methane destroyed at the electricity facility
E	Total errors of electricity's measurements
$F = D \cdot (1-E)$	Total methane corrected destroyed at the electricity
G	Total methane destroyed in the period
H	Density of Methane at the STPC
$I = G \cdot H$	Total weight of methane destroyed
J	CO ₂ equivalency
$K = J \cdot I$	Total equivalent carbon
L	Baseline
$M = K \cdot (1-L)$	Total Liquid Carbon
N	Total electricity exported
O ¹	Total electricity imported
P	Emission Factor
$Q = (N-O) \cdot P$	Total CO₂e from the energy export
$R = Q + M$	TOTAL CREDITS DURING THE PERIOD

To calculate the flare efficiency, the following formulae was applied:

1. Calculate the volume of CH₄ to the flares ($Flow_{methane}$)

$$Flow_{methane} = Flow_{FIR-200} \times \frac{\%_{methane}}{100}$$

2. Calculate the volume of other gases (remaining gases) going to the flare ($Flow_{remaining}$)

$$Flow_{remaining} = Flow_{FIR-200} - Flow_{methane}$$

3. Calculate the total flow entering the flare ($Flow_{total}$)

$$Flow_{Total} = Flow_{methane} + (Flow_{methane} \times air_{ratio}) + Flow_{remaining}$$

4. Calculate the methane mass in the exhaust gas ($M_{methane}$)

$$M_{methane} = Flow_{Total} \times \frac{CH_{4eg}}{1000}$$

5. Calculate the Flare Efficiency (FE)

$$FE = \frac{(Flow_{methane} \times 0,714) - \frac{M_{methane}}{1000}}{(Flow_{methane} \times 0,714)} \times 100$$

TASQA made analysis on both flares, and the results were:

F100: Methane Concentration = 3,1 mg/Nm³

F200: Methane Concentration = 4,0 mg/Nm³

Adopting a conservative approach, the value of 4,0 mg/Nm³ was used for calculations for this period.

D.2. Description and consideration of measurement uncertainties and error propagation:

The formulae used to calculate the error was (given specific error of each monitoring equipment, as presented on B.1):

$$\varepsilon = \sqrt{0,6^2 + 0,01^2 + 0,01^2 + 1^2} = 1,1663 \%$$

As the methane sent to the electricity production was not measured but calculated, a new error of the equipment must be calculated, assuming that the same equipment as those described above would be used. So, the error is calculated as:

$$\varepsilon = \sqrt{1,166^2 + 1,166^2} = 1,6494 \%$$

D.3. GHG emission reductions (referring to B.2. of this document):

D.3.1. Project emissions:

$$PE_{\text{monitoring period}} = 0$$

D.3.2. Baseline emissions:

$$BE_{\text{monitoring period}} = 142.928,5865 \text{ tCO}_2\text{e}$$

D.3.3. Leakage:

$$L_{\text{monitoring period}} = 0$$

D.3.4. Summary of the emissions reductions during the monitoring period:


Total CO ₂ e from methane destroyed in flares	133.478
Total CO ₂ e from electricity dispatched to the grid	9.449
TOTAL CO₂e	142.928

Annex 1

Analysis of Methane Content in the exhaust gas

Analysis made from BIOAGRI, in 30/08/2006

a) Flare F-100



BIOAGRI
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AJUDANDO VOCÊ A PRESERVAR O FUTURO

Tabela 01 - Chaminé do F-100
Determinação da Emissão de Compostos Orgânicos Gasosos

Amostragem	Data	Faixa de Carbono	Concentração nos Gases (ppm v/v)	Concentração nos Gases (mg /Nm ³)
01	30/08/06	CH ₄	< 2	< 1,4
02	30/08/06	CH ₄	< 2	< 1,4
03	30/08/06	CH ₄	< 2	< 1,4

Tabela 02 - Chaminé do F-100
Composição dos Gases

Teor de Oxigênio (O ₂) (% v/v)	Teor de Dióxido de Carbono (CO ₂) (% v/v)	Teor de Nitrogênio (N ₂) (% v/v)
3,3	9,9	86,8
3,3	10,6	86,1
2,4	10,2	87,4

Tabela 03 - Chaminé do F-100
Determinação da Recuperação do Traçador (Dimetil Éter)

Amostragem	Volume de Traçador adicionado (µL) (*)	Volume de Gas contido na BAG (L) (**)	Concentração Teórica Dimetil Éter (ppm v/v)	Concentração Encontrada Dimetil Éter (ppm v/v)	Recuperação (%)
01	10	11,962	83,6	79,3	94,9
02	10	17,824	56,1	45,5	81,1
03	10	17,55	57	61,4	108

Obs: Faixa de recuperação aceitável recomendada pelo Método USEPA 18 (70 a 130%).

(*) = Traçador Dimetil Éter (10% v/v em Nitrogênio)

(**) = O Volume de gás contido na BAG foi medido após a análise cromatográfica através da utilização do equipamento VOST (na tabela acima está descrito o volume acumulado na BAG, ou seja volume da BAG + volume de traçador injetado).

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Bioagri Ambiental Ltda. R. Augusto Planini, 201 - Bairro Dois Córregos - Piracicaba - SP - CEP. 13.420-833 - Fone: 0800.707.0729 - Fax: (19) 3417.4711 - ftelecom@bioagriambiental.com.br - www.bioagriambiental.com.br

b) Flare F-200



Tabela 01 - Chaminé do F-200
Determinação da Emissão de Compostos Orgânicos Gasosos

Amostragem	Data	Faixa de Carbono	Concentração nos Gases (ppm v/v)	Concentração nos Gases (mg /Nm ³)
01	30/08/06	CH ₄	< 2	< 1,4
02	30/08/06	CH ₄	< 2	< 1,4
03	30/08/06	CH ₄	< 2	< 1,4

Tabela 02 - Chaminé do F-200
Composição dos Gases

Teor de Oxigênio (O ₂) (% v/v)	Teor de Dióxido de Carbono (CO ₂) (% v/v)	Teor de Nitrogênio (N ₂) (% v/v)
3,8	8	88,2
5	8,2	86,8
4,5	9,2	86,3

Tabela 03 - Chaminé do F-200
Determinação da Recuperação do Traçador (Dimetil Éter)

Amostragem	Volume de Traçador adicionado (µL) (*)	Volume de Gas contido na BAG (L) (**)	Concentração Teórica Dimetil Eter (ppm v/v)	Concentração Encontrada Dimetil Eter (ppm v/v)	Recuperação (%)
01	10	12,446	80,3	91,4	114
02	10	16,401	61	57,8	94,8
03	10	14,855	67,3	67,4	100

Obs: Faixa de recuperação aceitável recomendada pelo Método USEPA 18 (70 a 130%).

(*) = Traçador Dimetil Éter (10% v/v em Nitrogênio)

(**) = O Volume de gás contido na BAG foi medido após a análise cromatográfica através da utilização do equipamento VOST (na tabela acima está descrito o volume acumulado na BAG, ou seja volume da BAG + volume de traçador injetado).

Analysis made from TASQA, in 30/11/2006

a) Flare F-100



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CEP 13149-000 - Paulínia - SP

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Home Page: <http://www.tasqa.com.br>

Resultados Analíticos

Determinação de Metano

Cliente:	Biogás Energia Ambiental S/A	Matriz:	Gás
Contato:	Cida Lopes	Data da Coleta:	30/11/2006
Fone / Fax:	(11) 3918 4833 Ramal 25	Coletado por:	TASQA
Objetivo:	Determinação de Metano	Transportado por:	TASQA
Projeto TASQA:	03540/06	Data do Recebimento:	30/11/2006
Projeto Cliente:	-	Data da Análise Cromatográfica	07/12/2006
Identificação da Amostra (Cliente):	Conforme identificação abaixo		
Identificação da Amostra (TASQA):	Conforme identificação abaixo		

Parâmetro Analisado	Amostra 08926/06 2ª Coleta (BAG) – Queimador Flare F100 mg/Nm³	LQ mg/Nm³
METANO	3,1	1,10

LQ = Limite de Quantificação

Os resultados acima apresentados referem-se exclusivamente às amostras analisadas.

NOTA: PROIBIDA A REPRODUÇÃO PARCIAL DESTES DOCUMENTOS.

Método:

Methane: Chrompack Application Note 1246 – GC.

Aprovado por:

Vivian Rafaela Koenig
CRQ 04449813 - 4ª Região
vkoenig@tasqa.com.br

Data: 29/12/2006

b) Flare F-200



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CEP 13140-000 - Paulínia - SP
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Home Page: <http://www.tasqa.com.br>

Resultados Analíticos
Determinação de Metano

Cliente:	Biogás Energia Ambiental S/A	Matriz:	Gás
Contato:	Cida Lopes	Data da Coleta:	30/11/2006
Fone / Fax:	(11) 3916 4833 Ramal 25	Coletado por:	TASQA
Objetivo:	Determinação de Metano	Transportado por:	TASQA
Projeto TASQA.:	03540/06	Data do Recebimento:	30/11/2006
Projeto Cliente:	-	Data da Análise Cromatográfica	07/12/2006
Identificação da Amostra (Cliente):	Conforme identificação abaixo		
Identificação da Amostra (TASQA):	Conforme identificação abaixo		

Parâmetro Analisado	Amostra 08925/06 1ª Coleta (BAG) – Queimador Flare F200 mg/Nm³	LQ mg/Nm³
METANO	4,0	1,10

LQ = Limite de Quantificação

Os resultados acima apresentados referem-se exclusivamente às amostras analisadas.

NOTA: PROIBIDA A REPRODUÇÃO PARCIAL DESTES DOCUMENTOS.

Método:

Methane: Chrompack Application Note 1246 – GC.

Aprovado por:

Vivian Rafaela Koenig Data: 29/12/2006
CRQ 04449813 - 4ª Região
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