

## Annexure 4: Stack Monitoring Test Reports for Methane



12/11/2007

**The Director**  
Raghurama Renewable Energy Limited  
Pamboor Village,  
Paramakudi Taluk  
Ramnad District, Tamilnadu

Dear Sir,

In reference to your letter, we hereby confirm that, we have carried out stack analysis for methane and other parameters for your boiler of 80 TPH capacity at Raghurama Renewable Energy Limited, Pamboor Village, Paramakudi Taluk, Ramnad District, Tamilnadu. The methane in stack gases is found to be below detectable limit i.e., less than 0.5% in all stack monitoring analysis reports carried by us. It should be noted that, if the % methane in stack is less than 0.5% it is below detectable limit (BDL).


The details of stack monitoring for your boiler carried by us during October 2004 to December 2006 on various dates are furnished below

Report Number	Report Date
1825	24/12/2004
2612	16/02/2005
0100	29/04/2005
0430	01/07/2005
0628	04/08/2005
1160	14/11/2005
1435	13/01/2006
1576	06/02/2006
0234	10/05/2006
0876	01/08/2006

This is for your information

Thanking you

Yours truly,  
For Hubert Enviro Care Systems (P) Ltd

  
A. Raghunathan  
Head - Laboratory

# 18, 92nd Street, Ashok Nagar, Chennai - 600 083.

Ph.: 43054091 - 43054095

Fax : 43054096 & 24891007

E-mail : mosess@md3.vsnl.net.in Website : www.hecs.co.in



**PHYSICO CHEMICAL DIVISION**  
**TEST REPORT**


Name of the Client : M/s.RAGHU RAMA  
 Address of the Client : Beside Melakavanoor EB Sub Sta  
 Sample Mark : Flue Gas Analysis  
 Sample Drawn by : Client  
 Sampling / Received Date : 29/06/05  
 Client's Reference : NH  
 Sample Reference No : E-W-400/06 -PC  
 Analysis Commenced On : 30/06/05

Page 1 of 1  
 Report No. 0430  
 Report Date: 01/07/05  
 Completed On: 30/06/05

S.No	Parameters	Units	Boiler ESP Outlet	Test Method
1	Carbon Monoxide	% V/V	0.92	Orsat - IS 13270 1992
2	Carbon Dioxide	% V/V	96.4	Orsat - IS 13270 1992
3	Oxygen	% V/V	2.58	Orsat - IS 13270 1992
4	Methane	% V/V	BDL	Electro Chemical Method

*Note: Below Detectable Limit;*

*Remarks: There is no direct limit applicable to stack monitoring as per TNPCC / CPCB Norms.*

Verified By  
  
 A. Raguathan  
 Manager (Laboratory)

*Note: Results related to the items tested only.*

**Hubert**

**ECS Enviro Care Systems (P) Ltd.**

(formerly Enviro Care Systems, Chennai, an ISO 9001 Company)



**PHYSICO CHEMICAL DIVISION**  
**TEST REPORT**

Name of the Client : M/s.RAGHU RAMA  
Address of the Client : RENEWABLE ENERGY LIMITED  
Beside Melakavanoor EB Sub Sta  
Pamboor Village, Paramakudi, Ramnad District  
Sample Mark : Flue Gas Analysis  
Sample Drawn by : Client  
Sampling / Received Date : 31/07/06  
Client's Reference : Nil  
Sample Reference No : E-W-573/07-PC  
Analysis Commenced On : 01/08/06

Page 1 of 1

Report No. 0876

Report Date : 01/08/06

Completed On: 01/08/06

S.No	Parameters	Units	Boiler ESP Outlet	Test Method	Limits
1	Stack Height	Meter	50	-	-
2	Stack Dia	Meter	1.3	-	-
3	Stack Temperature	$^{\circ}\text{C}$	136	-	-
4	Stack Velocity	m/sec	-	-	-
5	Flow Rate	$\text{Nm}^3/\text{hr}$	49,667	IS 11255 (part 3) 1999	-
6	Suspended Particulate Matter	$\text{mg}/\text{Nm}^3$	55	IS 11255 (part I) 1999	150
7	Oxides of Sulfur	$\text{mg}/\text{Nm}^3$	16	IS 11255 (part II) 1999	22 - 25
8	Oxides of Nitrogen	$\text{mg}/\text{Nm}^3$	10	IS 5182	15
9	Hydro Carbon	ppm	BDL	NDIR Technique	-
10	Methane	% V/V	BDL	Electro Chemical Method	-
11	Carbon Monoxide	% V/V	1.1	Orsat - IS 13270 1992	-
12	Carbon Dioxide	% V/V	95.8	Orsat - IS 13270 1992	-
13	Oxygen	% V/V	3.0	Orsat - IS 13270 1992	-

Note: BDL - Below Detectable Limit;

Remarks: There is no direct limit applicable to stack monitoring as per TNPCB / CPCB Norms,  
Verified By

*A.Raghuathan*  
A.Raghuathan  
Manager (Laboratory)

Note: Results related to the items tested only.

(formerly Enviro Care Systems, Chennai, an ISO 9001 Company)

**PHYSICO CHEMICAL DIVISION**  
**TEST REPORT**


Name of the Client	: M/s.RAGHU RAMA	Page 1 of 1
Address of the Client	: RENEWABLE ENERGY LIMITED	Report No. 0628
Sample Mark	: Beside Melakavanoor EB Sub Stn	Report Date : 04/08/05
Sample Drawn by	: Pamboor Village, Paramakudi, Ramnad District	
Sampling / Received Date	: Flue Gas Analysis	
Client's Reference	: Client	
Sample Reference No	: 01/08/05	
Analysis Commenced On	: Nil	
	: E-W-096/08 -PC	
	: 02/08/05	Completed On: 02/08/05

S.No	Parameters	Units	Boiler ESP Outlet	Test Method
1	Carbon Monoxide	% V/V	0.96	Orsat - IS 13270 1992
2	Carbon Dioxide	% V/V	95.4	Orsat - IS 13270 1992
3	Oxygen	% V/V	3.5	Orsat - IS 13270 1992
4	Methane	% V/V	BDL	Electro Chemical Method

*Note: Below Detectable Limit;*

*Remarks: There is no direct limit applicable to stack monitoring as per TNPCB / CPCB Norms,*

*Verified By.*

  
**A. Raghunathan**  
**Manager (Laboratory)**

*Note: Results related to the items tested only.*

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**Collaborator's Office :** Hubert Stearns P.V. P.O. Ramnad, 624571, Tamil Nadu



(formerly Enviro Care Systems, Chennai, an ISO 9001 Company)

**PHYSICO CHEMICAL DIVISION**  
**TEST REPORT**

Name of the Client : M/s.RAGHU RAMA  
Address of the Client : RENEWABLE ENERGY LIMITED  
: Beside Melakavanoor EB Sub Stn  
: Pamboor Village, Paramakudi, Ramnad District  
Sample Mark : Flue Gas Analysis  
Sample Drawn by : Client  
Sampling / Received Date : 04/02/06  
Client's Reference : Nil  
Sample Reference No : E-W-032/02 -PC  
Analysis Commenced On : 06/02/06

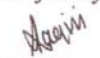
Page 1 of 1  
Report No. 1576  
Report Date : 06/02/06  
Completed On: 06/02/06

S.No	Parameters	Units	Boiler ESP Outlet	Test Method	Limits
1	Stack Height	Meter	50	-	-
2	Stack Dia	Meter	1.3	-	-
3	Stack Temperature	<sup>o</sup> C	131	-	-
4	Flow Rate	Nm <sup>3</sup> /hr	53,265	IS 11255 (part 3) 1999	-
5	Suspended Particulate Matter	mg/Nm <sup>3</sup>	46	IS 11255 (part I) 1999	150
6	Oxides of Sulfur	mg/Nm <sup>3</sup>	12	IS 11255 (part II) 1999	22 - 25
7	Oxides of Nitrogen	mg/Nm <sup>3</sup>	7	IS 5182	15
8	Hydro Carbon	ppm	BDL	NDIR Technique	-

Note: BDL – Below Detectable Limit;

Remarks: There is no direct limit applicable to stack monitoring as per TNPCB / CPCB Norms,

Verified By

  
A. Raghunathan  
Manager (Laboratory)

Note: Results related to the items tested only.

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**PHYSICO CHEMICAL DIVISION**  
**TEST REPORT**

Name of the Client : M/s.RAGHU RAMA  
 Address of the Client : RENEWABLE ENERGY LIMITED  
 : Beside Melakavanoor EB Sub Stn  
 : Pamboor Village, Paramakudi, Ramnad District  
 Sample Mark : Flue Gas Analysis  
 Sample Drawn by : Client  
 Sampling / Received Date : 06/05/06  
 Client's Reference : Nil  
 Sample Reference No : E-W-050/05 -PC  
 Analysis Commenced On : 08/05/06

Page 1 of 1  
 Report No. 0234  
 Report Date: 10/05/06  
 Completed On: 08/05/06

S.No	Parameters	Units	Boiler ESP Outlet	Test Method	Limits
1	Stack Height	Meter	50	-	-
2	Stack Dia	Meter	1.3	-	-
3	Stack Temperature	°C	133	-	-
4	Stack Velocity	m/sec	16.2	-	-
5	Flow Rate	Nm <sup>3</sup> /hr	49,740	IS 11255 (part 3) 1999	-
6	Suspended Particulate Matter	mg/Nm <sup>3</sup>	55	IS 11255 (part I) 1999	150
7	Oxides of Sulfur	mg/Nm <sup>3</sup>	9	IS 11255 (part II) 1999	22 - 25
8	Oxides of Nitrogen	mg/Nm <sup>3</sup>	6	IS 5182	15
9	Hydro Carbon	ppm	BDL	NDIR Technique	-
10	Methane	% V/V	BDL	Electro Chemical Method	-
11	Carbon Monoxide	% V/V	1.3	Orsat - IS 13270 1992	-
12	Carbon Dioxide	% V/V	95.4	Orsat - IS 13270 1992	-
13	Oxygen	% V/V	3.1	Orsat - IS 13270 1992	-

Note: BDL - Below Detectable Limit;

Remarks: There is no direct limit applicable to stack monitoring as per TNPCB / CPCB Norms,  
 Verified By

*A.Ragunathan*  
 Manager (Laboratory)

Note: Results related to the items tested only.

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# Hubert Enviro Care Systems (P) Ltd.

(An Associate of Hubert Stavoren B.V., Holland)



## PHYSICO CHEMICAL DIVISION TEST REPORT

Page 1 of 1

Name of the Client : M/s.RAGHU RAMA  
Address of the Client : RENEWABLE ENERGY LIMITED  
Sample Mark : Beside Melakavanoor EB Sub Stn  
Sample Drawn by : Pamboor Village, Paramakudi, Ramnad District  
Sampling / Received Date : Flue Gas Analysis  
Client's Reference : Client  
Sample Reference No : 09/01/06  
Analysis Commenced On : Nil  
Completed On: 11/01/06

S.No	Parameters	Units	Boiler ESP Outlet	Test Method	Limits
1	Stack Height	Meter	50	-	-
2	Stack Dia	Meter	1.3	-	-
3	Stack Temperature	<sup>o</sup> C	140	-	-
4	Stack Velocity	m/sec	16.1	-	-
5	Flow Rate	Nm <sup>3</sup> /hr	49,520	IS 11255 (part 3) 1999	-
6	Suspended Particulate Matter	mg/Nm <sup>3</sup>	60	IS 11255 (part I) 1999	150
7	Oxides of Sulfur	mg/Nm <sup>3</sup>	10	IS 11255 (part II) 1999	22 - 25
8	Oxides of Nitrogen	mg/Nm <sup>3</sup>	5	IS 5182	15
9	Hydro Carbon	ppm	BDL	NDIR Technique	-
10	Methane	% V/V	BDL	Electro Chemical Method	-
11	Carbon Monoxide	% V/V	1.2	Orsat - IS 13270 1992	-
12	Carbon Dioxide	% V/V	95.5	Orsat - IS 13270 1992	-
13	Oxygen	% V/V	3.1	Orsat - IS 13270 1992	-

Note: BDL - Below Detectable Limit;

Remarks: There is no direct limit applicable to stack monitoring as per TNPGB / CPCB Norms,

Verified By

A.Raghunathan  
Manager (Laboratory)

Note: Results related to the items tested only.

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**PHYSICO CHEMICAL DIVISION**  
**TEST REPORT**

Page 1 of 1

Name of the Client : M/s.RAGHU RAMA  
Report No. 1160  
RENEWABLE ENERGY LIMITED Report Date: 14/11/05

Address of the Client : Beside Melakavanoor EB Sub Stn  
Pamboor Village, Paramakudi, Ramnad District

Sample Mark : Flue Gas Analysis

Sample Drawn by : Client

Sampling / Received Date : 11/11/05

Client's Reference : Nil

Sample Reference No : E-W-188/11 -PC


Analysis Commenced On : 12/11/05

Completed On: 12/11/05

S.No	Parameters	Units	Boiler ESP Outlet	Test Method
1	Carbon Monoxide	% V/V	0.99	Orsat - IS 13270 1992
2	Carbon Dioxide	% V/V	94.8	Orsat - IS 13270 1992
3	Oxygen	% V/V	4.2	Orsat - IS 13270 1992
4	Methane	% V/V	BDL	Electro Chemical Method

*Note: Below Detectable Limit;*

*Remarks: There is no direct limit applicable to stack monitoring as per TNPCB / CPCB Norms,*

*Verified By*  
  
**A. Raghunathan**  
**Manager (Laboratory)**

*Note: Results related to the items tested only.*

**Corporate Office : #18, 92nd Street, Ashok Nagar, Chennai - 600 083.**

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# Hubert Enviro Care Systems (P) Ltd.

(An Associate of Hubert Stavoren B.V., Holland)



## PHYSICO CHEMICAL DIVISION

### TEST REPORT

Page 1 of 1

Name of the Client : M/s.RAGHU RAMA  
Address of the Client : RENEWABLE ENERGY LIMITED  
Sample Mark : Beside Melakavanoor EB Sub Stn  
Sample Drawn by : Pamboor Village, Paramakudi, Ramnad District  
Sampling / Received Date : Flue Gas Analysis  
Client's Reference : Client  
Sample Reference No : 12/02/05  
Analysis Commenced On : Nil  
Completed On: 14/02/05

S.No	Parameters	Units	Boiler ESP Outlet	Test Method	Limits
1	Stack Height	Meter	50	-	-
2	Stack Dia	Meter	1.3	-	-
3	Stack Temperature	°C	144	-	-
4	Stack Velocity	m/sec	16.0	-	-
5	Flow Rate	Nm <sup>3</sup> /hr	49,580	IS 11255 (part 3) 1999	-
6	Suspended Particulate Matter	mg/Nm <sup>3</sup>	50	IS 11255 (part I) 1999	150
7	Oxides of Sulfur	mg/Nm <sup>3</sup>	12	IS 11255 (part II) 1999	22 - 25
8	Oxides of Nitrogen	mg/Nm <sup>3</sup>	7	IS 5182	15
9	Hydro Carbon	ppm	BDL	NDIR Technique	-
10	Methane	% V/V	BDL	Electro Chemical Method	-
11	Carbon Monoxide	% V/V	1.0	Orsat - IS 13270 1992	-
12	Carbon Dioxide	% V/V	95.6	Orsat - IS 13270 1992	-
13	Oxygen	% V/V	3.2	Orsat - IS 13270 1992	-

Note: BDL - Below Detectable Limit;

Remarks: There is no direct limit applicable to stack monitoring as per TNPCB / CPCB Norms,  
Verified By

A.Raghu Nathan  
Manager (Laboratory)

Note: Results related to the items tested only.

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# Enviro Care Systems

(An associate of Hubert Stavoren B.V., Holland)



## PHYSICO CHEMICAL DIVISION TEST REPORT

Page 1 of 1

Report No. 1825

Name of the Client : M/s. Raghu Rama  
Renewable Energy Limited  
Address of the Company : Beside Melakavanoor EB Sub Stn Report Date: 24/12/04  
Pamboor Village, Paramakudi, Ramnad District  
Sample Description : Flue Gas Analysis On Boiler  
Sample Drawn by : Enviro Care Systems  
Sampling Date : 19/12/04 - 19/12/04  
Client's Reference : Nil  
Sample Reference No : E-S-306/12-PC  
Method of Sampling & Analysis: Electro Chemical Method  
Equipment Name : Vayubodan

S.No	Sampling Date	Sampling Location	O <sub>2</sub> % V/V	CO <sub>2</sub> % V/V	CO ppm	Methane (CH <sub>4</sub> )
1	19/12/04	Boiler ESP Outlet	3.1	96.4	908	BDL

Note:- BDL - Below Detectable Limit:

CO- Carbon Monoxide; CO<sub>2</sub> - Carbon dioxide; O<sub>2</sub> - Oxygen

Authorized Signatory

#18 (Old #26), 92nd Street, Ashok Nagar, Chennai-600 083.

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# Enviro Care Systems

(An associate of Hubert Stavoren B.V., Holland)



## PHYSICO CHEMICAL DIVISION

### TEST REPORT

Page 1 of 1

Report No. 0100

Name of the Client

: M/s. Raghu Rama

Renewable Energy Limited

Address of the Company

: Beside Melakavanoor EB Sub Stn Report Date: 29/04/05

Pamboor Village, Paramakudi, Ramnad District

Sample Description

: Flue Gas Analysis On Boiler

Sample Drawn by

: Enviro Care Systems

Sampling Date

: 23/04/05 - 25/04/05

Client's Reference

: RRRELSITE/GEN/ENVI/002/05-06. Date: 18/04/05.

Sample Reference No

: E-S-360/04-PC

Method of Sampling & Analysis: Electro Chemical Method

Equipment Name

: Vayubodan

S.No	Sampling Date	Sampling Location	O <sub>2</sub> % V/V	CO <sub>2</sub> % V/V	CO ppm	Methane (CH <sub>4</sub> )
1	23/04/05	Boiler ESP Outlet	3.3	95.8	920	BDL

Note:- BDL - Below Detectable Limit:

CO- Carbon Monoxide; CO<sub>2</sub>- Carbon dioxide; O<sub>2</sub>- Oxygen



*[Signature]*

Authorized Signatory

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