



**Energy Efficient Technology & Impact Created  
Nevco Engineers Pvt Ltd**

**ADARSH KAPUR**

**M.Tech Instrumentation BITS PILANI – RANKED FIRST**

**Managing Director**

**adarsh.kapur@nevcoengineers.com**

- ❖ We are one of the leading MSME registered technology providers in India for implementation of monitoring of various parameters towards energy conservation.
- ❖ We started our operations towards imparting energy conservation techniques way back in early 90s. Since then, we have educated hundreds of industries towards saving fuel oil used in high capacity boilers.
- ❖ We work very closely with Central Pollution Control Board for efficient monitoring solutions.

- ❖ Optimization of a combustion process through plant operation at the most effective excess air level has, besides reduction of emission levels, the objective of saving fuel costs. Based on experience and documented in the literature is the fact, that reduction of oxygen excess of 1%-point, e.g. from 4,5% to 3,5%, will improve the efficiency of the combustion plant by 1%.
- ❖ This was and is being used by us very extensively to educate users of industrial boilers.

- ❖ We were the first company in India who introduced the use of portable flue gas analysis measurements.
- ❖ It is well known fact that reduction of 1 % O<sub>2</sub> in flue gas results in 1 % fuel savings. This is very big energy savings. This concept was implemented by us, in early 90s.
- ❖ We held numerous conferences, seminars, worked very closely with Petroleum Conservation Research Association and National Productivity Council towards education industries in use of flue gas analysers and subsequent fuel savings.

## 2. BOILERS

### Syllabus

**Boilers:** Types, Combustion in boilers, Performances evaluation, Analysis of losses, Feed water treatment, Blow down, Energy conservation opportunities.

### 2.1 Introduction

A **boiler** is an enclosed vessel that provides a means for combustion heat to be transferred into water until it becomes heated water or steam. The hot water or steam under pressure is then usable for transferring the heat to a process. Water is a useful and cheap medium for transferring heat to a process. When water is boiled into steam its volume increases about 1,600 times, producing a force that is almost as explosive as gunpowder. This causes the boiler to be extremely dangerous equipment that must be treated with utmost care.

The process of heating a liquid until it reaches its gaseous state is called evaporation. Heat is transferred from one body to another by means of (1) radiation, which is the transfer of heat from a hot body to a cold body without a conveying medium, (2) convection, the transfer of heat by a conveying medium, such as air or water and (3) conduction, transfer of heat by actual physical contact, molecule to molecule.

### Boiler Specification

The heating surface is any part of the boiler metal that has hot gases of combustion on one side and water on the other. Any part of the boiler metal that actually contributes to making steam is heating surface. The amount of heating surface of a boiler is expressed in square meters. The larger the heating surface a boiler has, the more efficient it becomes. The quantity of the steam produced is indicated in tons of water evaporated to steam per hour. Maximum continuous rating is the hourly evaporation that can be maintained for 24 hours. F & A means the amount of steam generated from water at 100 °C to saturated steam at 100 °C.

#### Typical Boiler Specification

<b>Boiler Make &amp; Year</b>	: XYZ & 2003
<b>MCR</b> (Maximum Continuous Rating)	: 10TPH (F & A 100°C)
<b>Rated Working Pressure</b>	: 10.54 kg/cm <sup>2</sup> (g)
<b>Type of Boiler</b>	: 3 Pass Fire tube
<b>Fuel Fired</b>	: Fuel Oil

### Indian Boiler Regulation

The Indian Boilers Act was enacted to consolidate and amend the law relating to steam boilers. Indian Boilers Regulation (IBR) was created in exercise of the powers conferred by section 28 & 29 of the Indian Boilers Act.

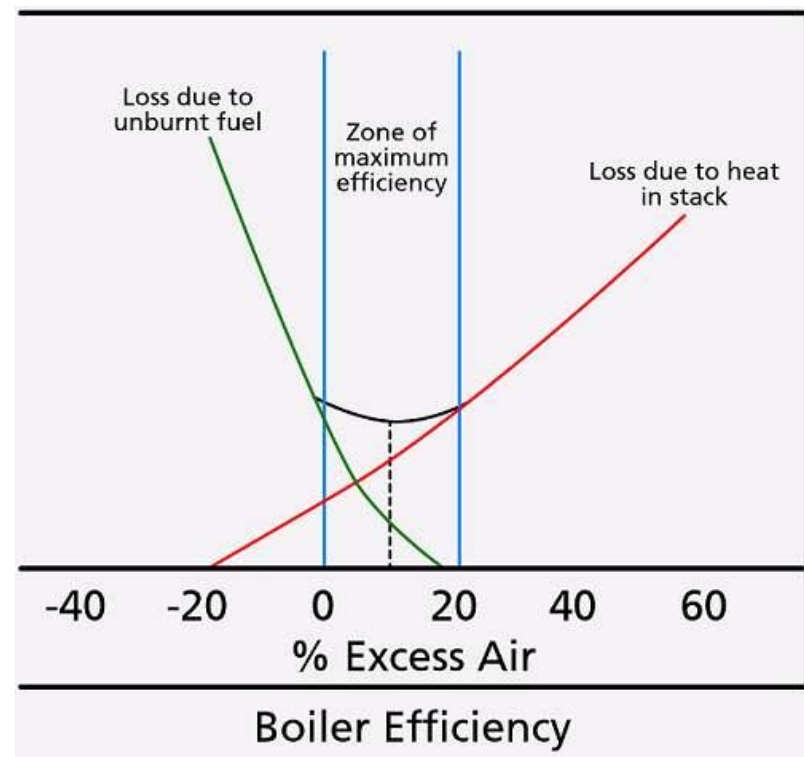
TABLE 2.5 EXCESS AIR LEVELS FOR DIFFERENT FUELS		
Fuel	Type of Furnace or Burners	Excess Air (% by wt)
Pulverised coal	Completely water-cooled furnace for slag-tap or dry-ash removal	15–20
	Partially water-cooled furnace for dry-ash removal	15–40
Coal	Spreader stoker	30–60
	Water-cooler vibrating-grate stokers	30–60
	Chain-grate and traveling-gate stokers	15–50
	Underfeed stoker	20–50
Fuel oil	Oil burners, register type	15–20
	Multi-fuel burners and flat-flame	20–30
Natural gas	High pressure burner	5–7
Wood	Dutch over (10–23% through grates) and Hofft type	20–25
Bagasse	All furnaces	25–35
Black liquor	Recovery furnaces for draft and soda-pulping processes	30–40

Controlling excess air to an optimum level always results in reduction in flue gas losses; for every 1% reduction in excess air there is approximately 0.6% rise in efficiency.

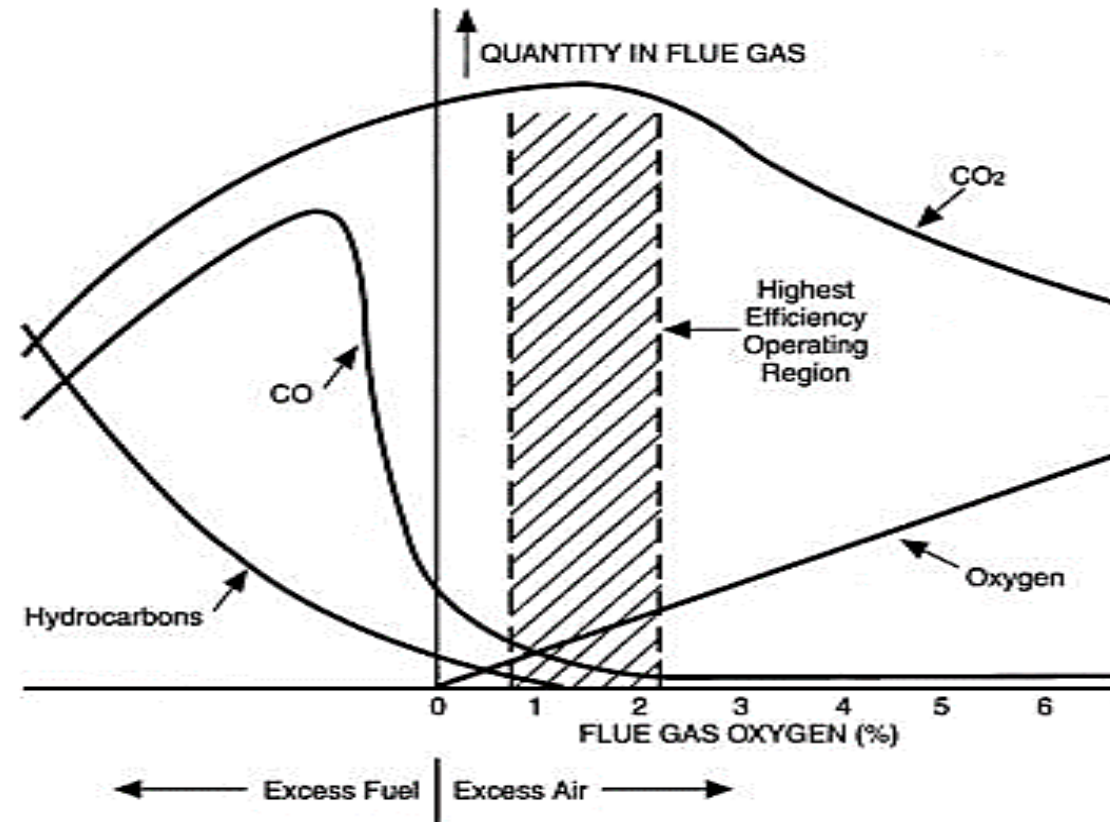
Various methods are available to control the excess air:

- Portable oxygen analysers and draft gauges can be used to make periodic readings to guide the operator to manually adjust the flow of air for optimum operation. Excess air reduction up to 20% is feasible.

❖ We have supplied thousands of these instruments and nearly one out of two large boilers in India use our instruments. We got numerous appreciation testimonials from industries who had saved fuel. Similar letters on energy conservation achieved were also received from PCRA and NPC.

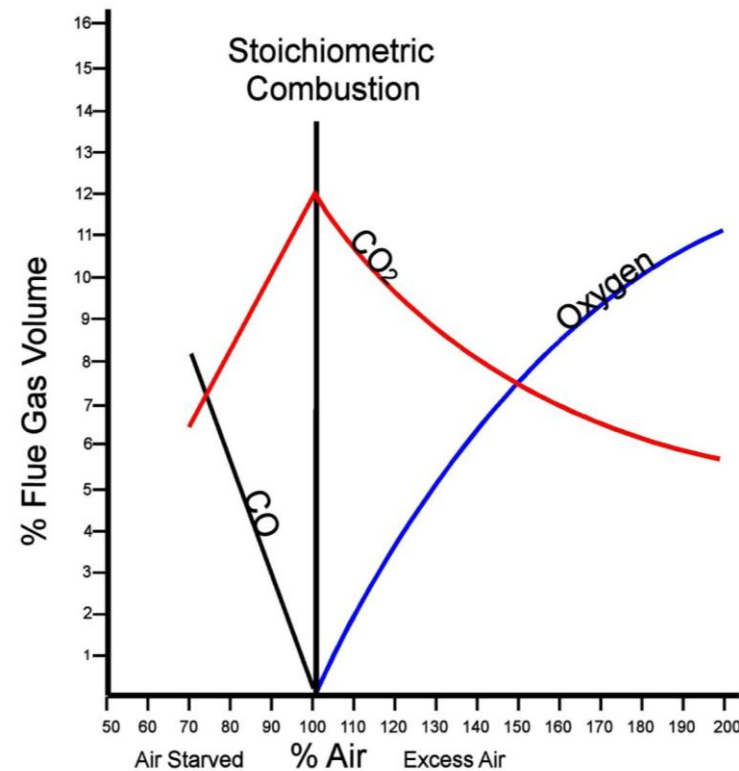


❖ Our efforts in last 30 years have saved India very large amount of fuel burnt in boilers mainly oil. This is a continuous process and today also we are doing this work extensively. We maintain, calibrate hundreds of instruments every year and because of this, industries are able to save energy i.e. fuel.





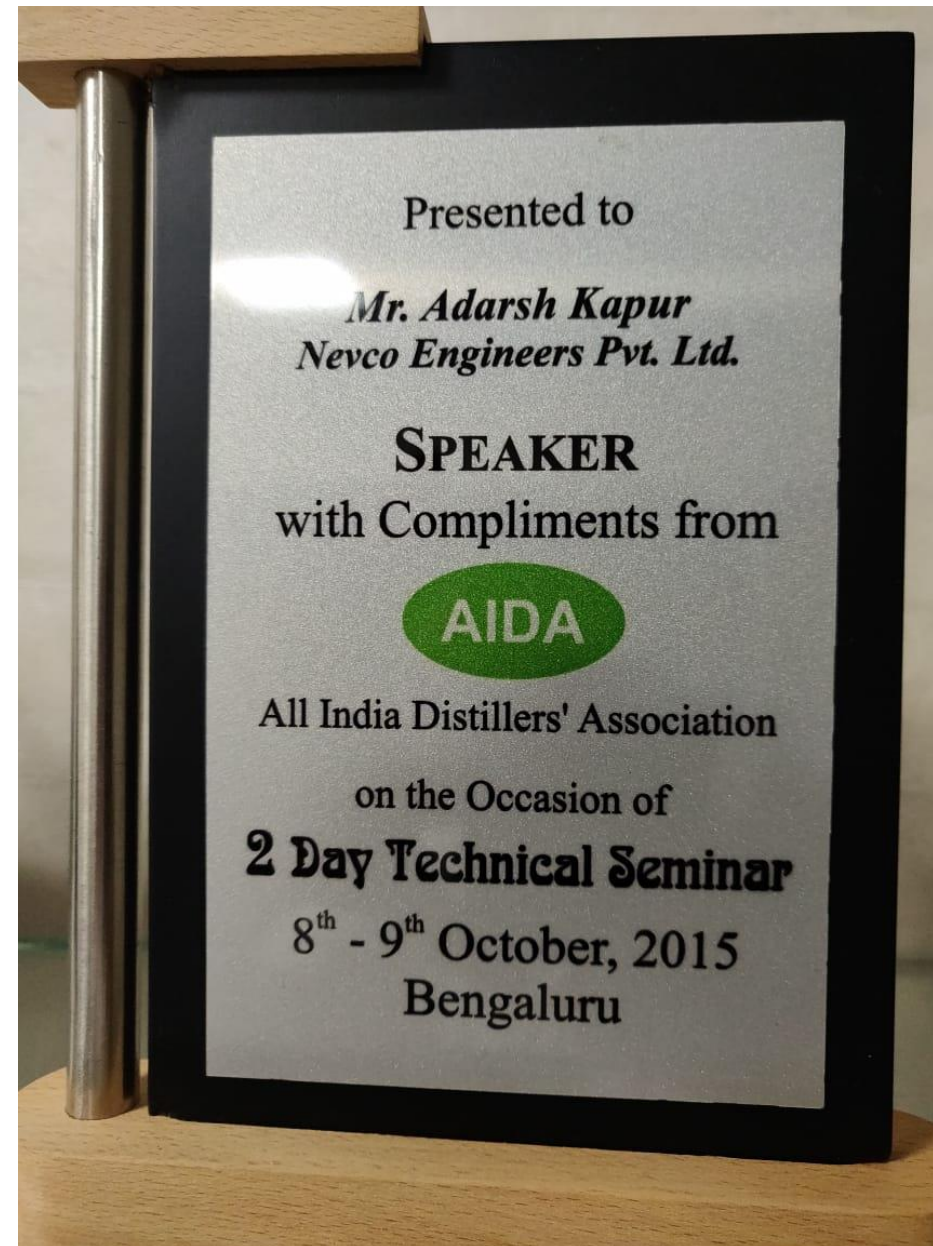
- ❖ We till today undertake joint seminars including with CII wherein industries are educated on fuel savings and energy conservation. Hundreds of demonstrations are done in a year by our various offices all over India wherein industries are told to control their flue gases, reduce excess air and save energy.



## IMPACT CREATED

We created maximum impact in spreading awareness on fuel/energy savings by working in close association with organisations like PCRA . NPC , CII.

However enormous impact was created in working with associations of different industries. These are very well attended and we did numerous model demonstration in one unit which was attended by large number of technical persons from different units.

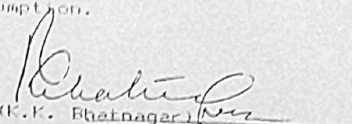


(पेट्रोलियम एवं रसायन विभाग, भारत सरकार, के अन्तर्गत एक पंजीकृत सोसायटी)  
प्रोजेक्ट सेक्रेटरियेट : 1008, न्यू दिल्ली हाउस, 27, बाराखम्बा रोड, नई दिल्ली-110001  
(A REGISTERED SOCIETY UNDER THE MINISTRY OF PETROLEUM & CHEMICALS, GOVT. OF INDIA)  
PROJECT SECRETARIAT-1008, NEW DELHI HOUSE, 27, BARAKHAMBHA ROAD, NEW DELHI-110 001.

Dated Jan. 29, 1991.

TO WHOMSOEVER IT MAY CONCERN

We have been using 21 Nos. of Fuel Efficiency Monitors since 1985 of Neutronics make supplied by M/s. Combustion Analysers, Delhi. These instruments are useful in measurement of oxygen and temperature of flue gases, combustion efficiency; and guide in taking corrective measures for bringing down fuel consumption.


  
(K.K. Bhattacharya)  
Deputy Manager (FA)

उत्पादकता भवन, लोदी रोड,  
नई दिल्ली-११० ००३  
Utpadakta Bhavan, Lodi Road  
New Delhi-110 008

No. 80725  
13th Feb. 1990

TO WHOM SO EVER IT MAY CONCERN

This is to certify that NPC offices in various regional locations have been using portable combustion analyser model FEM-500 (of Neutronics make) supplied by M/s Combustion Analyser, New Delhi. This instrument has been extensively used by our consultants and we have been using 10 such sets for our fuel efficiency activities and we find it very useful in demonstrating in the industries as to energy conservation measures applicable to boilers, furnace and fired heaters.

  
( K.C. Mahajan )  
Director  
for Director-General.



Gram : JAYKAYCEM  
Phone : 260, 275, 276, 270, 253, 249, 268

## J. K. White Cement Works

Div. I J. K. Synthetics Ltd.

P.O. GOTAN - 342 902, District Nagaur (Raj.), INDIA

GEN:WH:ELIN.12/6/94 25th September, 1992.

M/s. Combustion Analyser,  
108, Kailash Hills (2nd Floor),  
NEW DELHI- 110065.

Attn: Mr. Agarish Kapoor

Dear Sir,

This has reference to your recent letter desiring our comments on the usefulness of Fuel Efficiency Monitor (FEM) & optifuel.

It is our pleasure to inform you that we have been greatly benefitted by use of these equipments. By measurement of oxygen(O2) content in flue gas, we could determine the false air at various locations. This helped us to pin-point the leakages in the system which are subsequently plugged.

Due to appreciable lowering of false air, the saving was experienced in fuel and electrical power consumption which led to higher production at economy.

As informed earlier, we have been using the FEM for past six years & optifuel for one year.

Thanking you,

Yours faithfully,  
for JK WHITE CEMENT WORKS  
  
( B. K. ARORA )  
SR. GENERAL MANAGER (WORKS)

**City** : Jaipur

**Address** : B-81, Shastri Nagar

**Pin** : 302026

**Phone** : 3301144

**Telex** : 031-61619 JKLN IN

**Cable** : JAYKAYCEM

**City** : Jaipur

**Address** : Dakshinamer Building, 4th Floor

**Pin** : 302010

**Phone** : 3324110

**Telex** : 031-61619 JKLN IN

**Cable** : JAYKAYCEM

**City** : Jaipur

**Address** : 10th Hilly Road, New Delhi - 110 001

**Pin** : 110 001

**Phone** : 311478 (6 lines)

**Telex** : 0328-216 JAYK IN

**Cable** : NYLON

**City** : Jaipur

**Address** : Kamla Tower, Jaipur - 302 001

**Pin** : 302 001

**Phone** : 3622231 (7 lines)

**Telex** : 011-76910 JKLN IN

**Cable** : TRULIGHT

PRODUCERS OF HIGH QUALITY WHITE CEMENT

## HYDERABAD INDUSTRIES LIMITED

Sector-25, Faridabad-121004 Haryana (INDIA)

TEL : (0129) 232031/32  
FAX : (0129) 232914  
TELEX : 0343-331 HACP IN  
CABLE : ASBESTOS

23rd Jul '94

TO WHOM IT MAY CONCERN

The fuel efficiency monitor FEM 500 supplied by M/s Combustion Analyser, Delhi has proved to be a very useful instrument for monitoring the boiler combustion parameter and thereby fuel conservation. We found that the instrument to be the most useful tool for a boiler house. We are very much satisfied with its performance as the same is being regularly used at our works at Ballabgarh and Dharuhera.

BS-L  
B. SAHA  
( MAINTENANCE MANAGER )

GK/BS/VKM

## SUNDARAM INDUSTRIES LIMITED

RUBBER FACTORY, POST BOX No. 6  
USILAMPATTI ROAD, KOCHADAI, MADURAI - 625 016

Phone: 601531 (4 Lines)  
Grams: 'SIRUBBER'

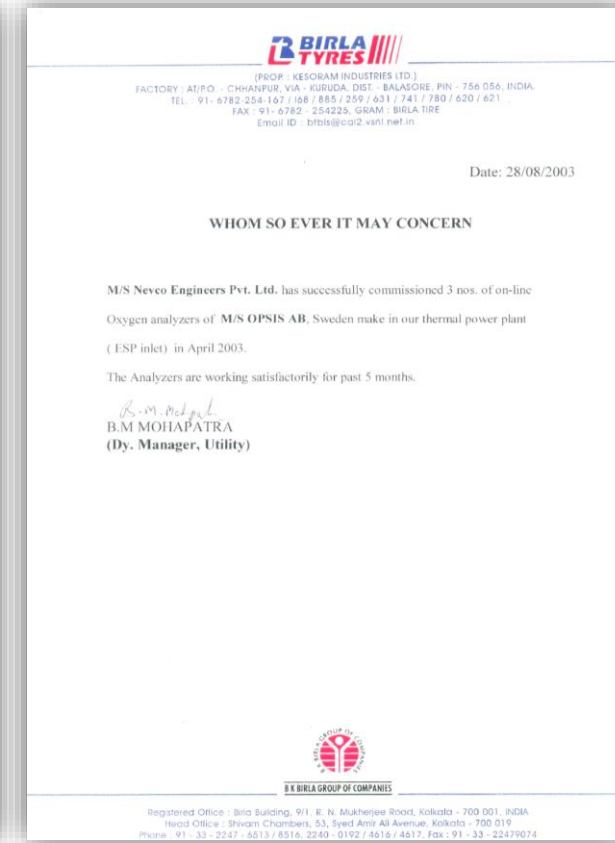
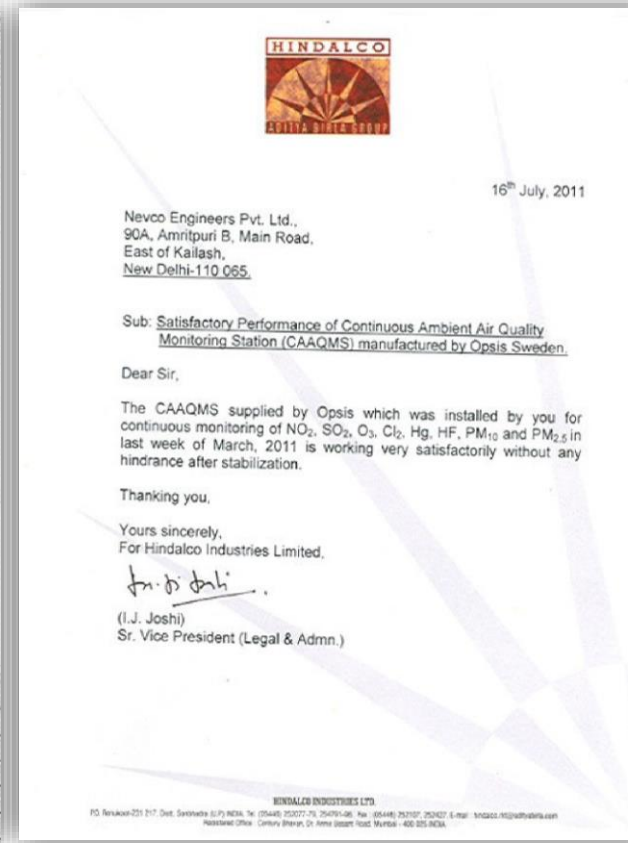
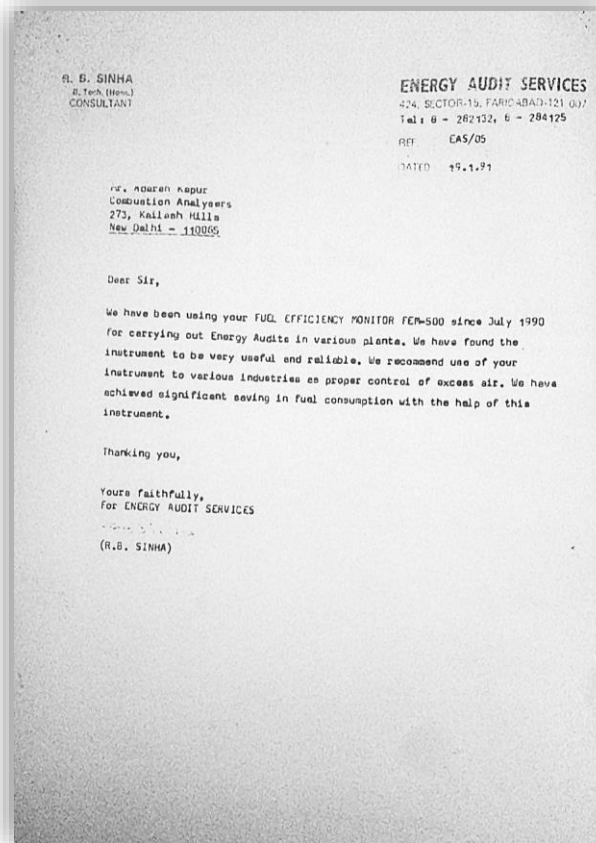
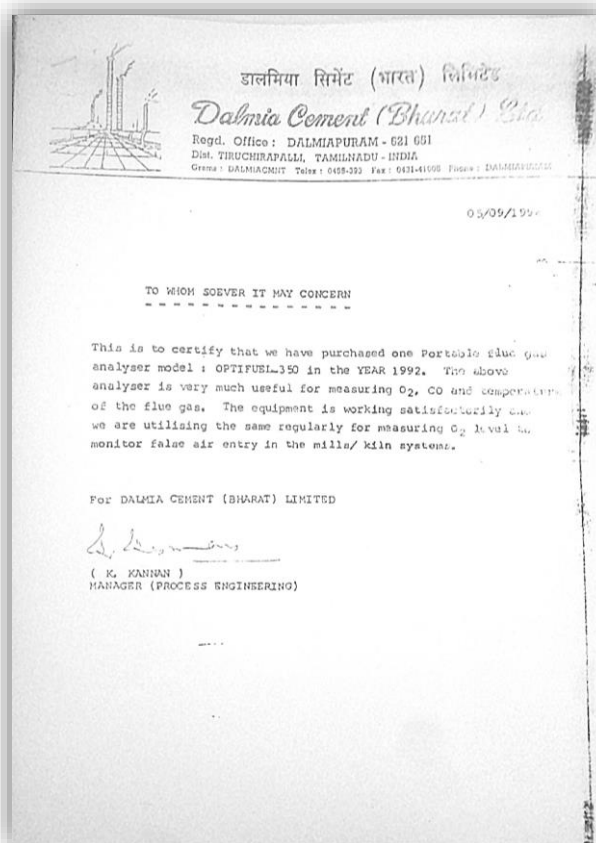
Dated Oct. 21, 1994.

TO WHOMSOEVER IT MAY CONCERN

We have been using 1 No. of Fuel Efficiency Monitor of Neutronics make supplied by M/s. Combustion Analyser, Delhi. This instrument is useful in measurement of Oxygen and temperature of flue gases, Combustion Efficiency and guide in taking corrective measures for bringing down fuel consumption.

D. Jeyanathan  
MANAGER MAINTENANCE.

(Registered Office: TVS BUILDING, WEST VELI STREET, MADURAI - 625 001)







**Essar Steel India Limited**  
Near Flyover  
Sonoli Road  
Vaghnapuram - 520 004,  
Andhra Pradesh  
India

T : + 91 891 2529 213  
F : + 91 891 2529 383  
www.essar.com

Date: 27.11.2012

## TO WHOM SO EVER IT MAY CONCERN

Continuous Ambient Air Quality Monitoring Station (CAAQMS) for monitoring of SO<sub>2</sub>, NO<sub>2</sub>, PM10 & PM2.5 of OPSIS AB, Sweden has been installed & Commissioned in our plant premises since May, 2012. This System connected to APPCB server for public information. M/s Nevco Engineers Pvt. Ltd. (Indian Distributor of M/s OPSIS AB, Sweden) commissioned the system and the system has been working satisfactorily since commissioned.

Path Length is 400 mts. We are getting the data capture of 100% and no maintenance is required except putting filter papers in PM10 & PM2.5 Analysers in every 40 days.

Services provided by M/s Nevco Engineers are satisfactory.

For Essar Steel India Limited

Satya Prasad KS  
Sr. Manager (Env & PC)

Essar Steel India Limited  
Registered Office: 27th KM, Sund Hazari Road, Hazari - 394270 Dist. Surat

T : + 91 261 688 2400 F : + 91 261 688 5544 / 688 5746

STEEL, FOL & GASL POWER, COMMUNICATIONS, SHIPPING & PORTS, PROJECTS, MINERALS



इंडियन फार्मर्स फर्टिलाइजर कोऑपरेटिव लिमिटेड  
INDIAN FARMERS FERTILISER COOPERATIVE LIMITED

24<sup>th</sup> April, 2017

## Performance Certificate

### TO WHOMSOEVER IT MAY CONCERN

We have procured OPSIS AB, Sweden make Online Ambient Air Quality monitoring system Model AR500 (US EPA, TUV & MCERTS approved) for SO<sub>2</sub>, NO<sub>2</sub>, NH<sub>3</sub> measurements in Ambient Air Quality & Model SM200 (US EPA, TUV & MCERTS approved) for PM10 & PM2.5 measurements in Ambient Air Quality on 27<sup>th</sup> March, 2015.

The analysers are installed with OPEN PATH DOAS technology. This is based on Differential Optical Absorption Spectroscopy technique. (DOAS)

The above analysers has been commissioned satisfactorily in our plant on 10<sup>th</sup> October, 2015 By Nevco Engineers Pvt Ltd, New Delhi's Surat Office.

After sales support, maintenance and calibration facility has been provided satisfactorily by Nevco Engineers Pvt Ltd, Surat

Data capture rate is 100% and real time data are being transmitted to CPCB and SPCB, since October, 2015.

Sr. Manager (Laboratory)  
IFFCO, Kandla,  
Gujarat

ईसीएल इंडिया लिमिटेड / Kandla Unit, कैंडला / Kandla, गुजरात / कांचची, (गुजरात) / (Gujarat) - 370210  
फोन / Phones : 02836-254000, 270381, 270382 फैक्स / Fax : 02836-270642 ईमेल : ifco\_kandla@ifco.in  
Website : www.ifco.in, www.ifco.coop Connect with us : https://twitter.com/IFFCO\_PR, https://facebook.com/IFFCO.PR



The Andhra Petrochemicals Limited

## TO WHOMSOEVER IT MAY CONCERN

Date: 04/04/2010

We have procured one no. Continuous Ambient Air Monitoring Station from M/s Opalis AB in Sweden through their Indian distributors M/s Nevco Engineers Pvt Ltd. in April 2009. The system continuously measures SO<sub>2</sub>, NO<sub>2</sub>, O<sub>3</sub>, Benzene and PM10. This was installed and commissioned by Nevco Engineers Pvt Ltd. The real time data for all gases is being transferred to scrolling public display board. The light path has 350 meters path length and average readings over this path length are being displayed and logged.

The above system is working very well ever since installed without any maintenance and 100% data capture time is being achieved.

We are happy with the system, its installation / working & services being provided and recommend this technology for Continuous Ambient Air Quality Monitoring. Anyone interested in physically looking at the system and its working is welcome to visit us with prior appointment. We are submitting this data to local Pollution Control Board.

For The Andhra Petrochemicals Limited,

[M.V.L. PRASAD]  
Vice President (Operations & Tech. Services)



FACTORY : Op<sub>2</sub>, HALVAL DOCK YARD, POST BOX NO. 1401, VISAKHAPATNAM - 530 014  
Phones : (0891) 3891500, Fax : 2577751, Grams : PETROCHEM, E-mail : info.vskp@andrapetrochemicals.com  
REGD. OFFICE : VENKATAPURAM, TANJAVUR - 534 215, W.G. DIST., A.P. INDIA



**THE WEST COAST PAPER MILLS LTD.,**

Regd. Office & Works : PB, No 5, Rangar Nagar, DANDELIS, 587-225, Dist. Uttara Kannada (Karnataka) India  
Grams : "KALANIL" Phone Nos. : (08248) 231391 - 395 (5 Lines)  
Fax Nos. : (08248) - 231 323 (Admin. Off.) 232150 (Sales A/c.) 230443 (Works Off.) 232148 (Paper Godown)

Date: 09.08.2016

## TO WHOM SO EVER IT MAY CONCERN

We are using first CAAQMS system OPSIS AB, Sweden make at 4 different places of our premises to monitor SO<sub>2</sub>, NO<sub>2</sub>, H<sub>2</sub>S, PM10 & PM2.5. The same was commissioned by NEVCO ENGINEERS PVT LTD on January 2013. All the gases are measured by DOAS open path technique and all are approved by USEPA, TUV & MCERTS.

Performances of these DOAS Based CAAQMS systems are very much satisfactory.

Also we had procured 5 numbers CEMS (DOAS Technique) for the measurement of SO<sub>2</sub>, NO, NO<sub>2</sub>, NOX & H<sub>2</sub>S and SPM analysers for 2 numbers Rotary Lime Kilns, 2 numbers FBC Coal Fired boilers and 1 number Chemical Recovery Boiler.

The performance of DOAS based CEMS analyser are also very much satisfactory.

S. SANKARANARAYANAN  
SR. GENERAL MANAGER (INSTRUMENT & ELECTRICAL)  
THE W. C. P. M. LTD. DANDELIS

Thank You

Adarsh Kapur

Managing Director

adarsh.kapur@nevcoengineers.com

m: +91-9873163900