Latest Technology in Continuous Emission and Ambient Air Quality Monitoring

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Country Manager - Indian Operations
OPSIS AB,Sweden

INTRODUCTION

OPSIS is a Swedish company which develops, manufactures and supplies total solutions for Ambient Air Quality Monitoring, Stack Emission Monitoring and software tools for Air Quality Management.

Founded 1985, current turnover(2016) , INR 1500 Crores

OPSIS is represented world-wide, with internationally accepted and approved products.

TÜV Rheinland

中华人民共和国
计量器具型式批准证书

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

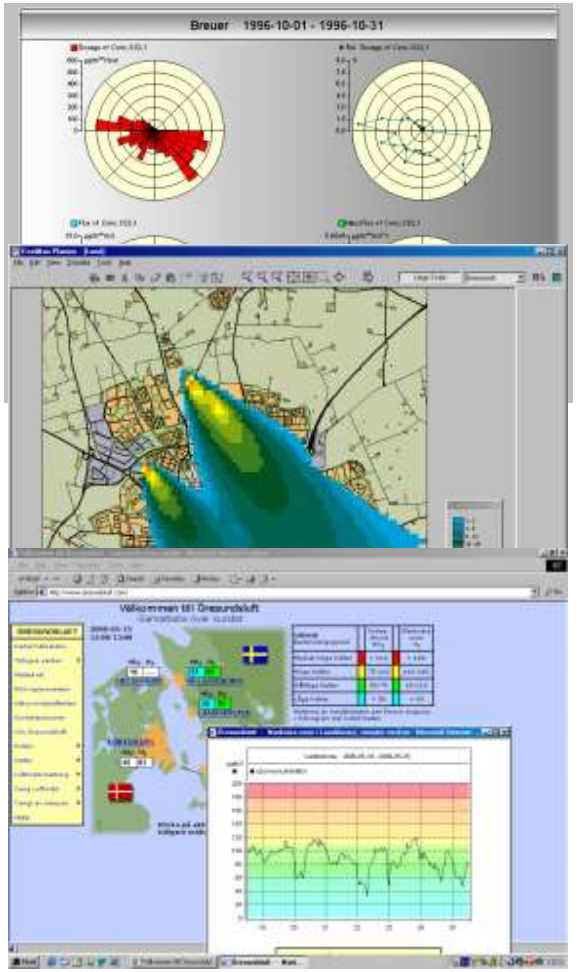
CERTIFIED ISO 9001 ISO 14001 SEMKO-DEKRA

CE

SWEDAC ACKREDITERING
1386
ISO/IEC 17025

EPA United States Environmental Protection Agency
"...to protect human health and to safeguard the natural environment..."

MAJOR APPLICATION AREAS



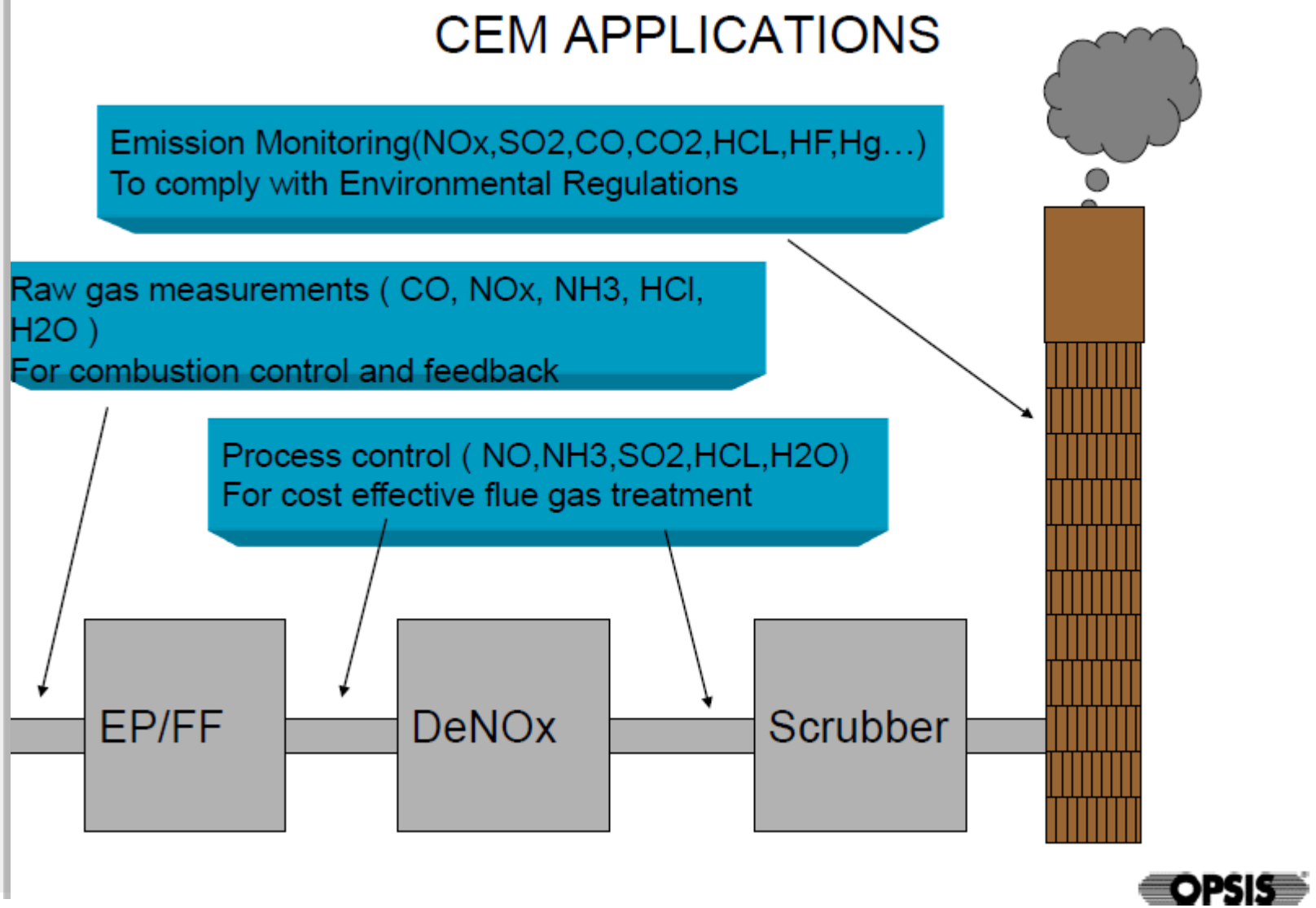
QUALITY AND ENVIRONMENTAL MANAGEMENT

ISO 9001
- Quality

ISO 14001
- Environment

ISO 17025
- Calibration laboratory
- Ackreditation laboratory

Afer using Alternate Fuel for Combustion :



EUROPEAN REGULATION

EC Directive 2000/76/EC applies to Waste Incineration plants and Cement plants using co-incineration

Compound			Emission limit value 24 hour
			(mg/m3 , NTP, 10 % O_2)
Particles			30
TOC			10
HCl			10
HF			1
SO_2			50
NO_X			800/500 (old/new plant)
CO			Set by authority

New regulations for Mercury on its way !

TECHNOLOGIES FOR CEMS (Continuous Stack Emission Monitoring)

Continuous Emission Monitoring

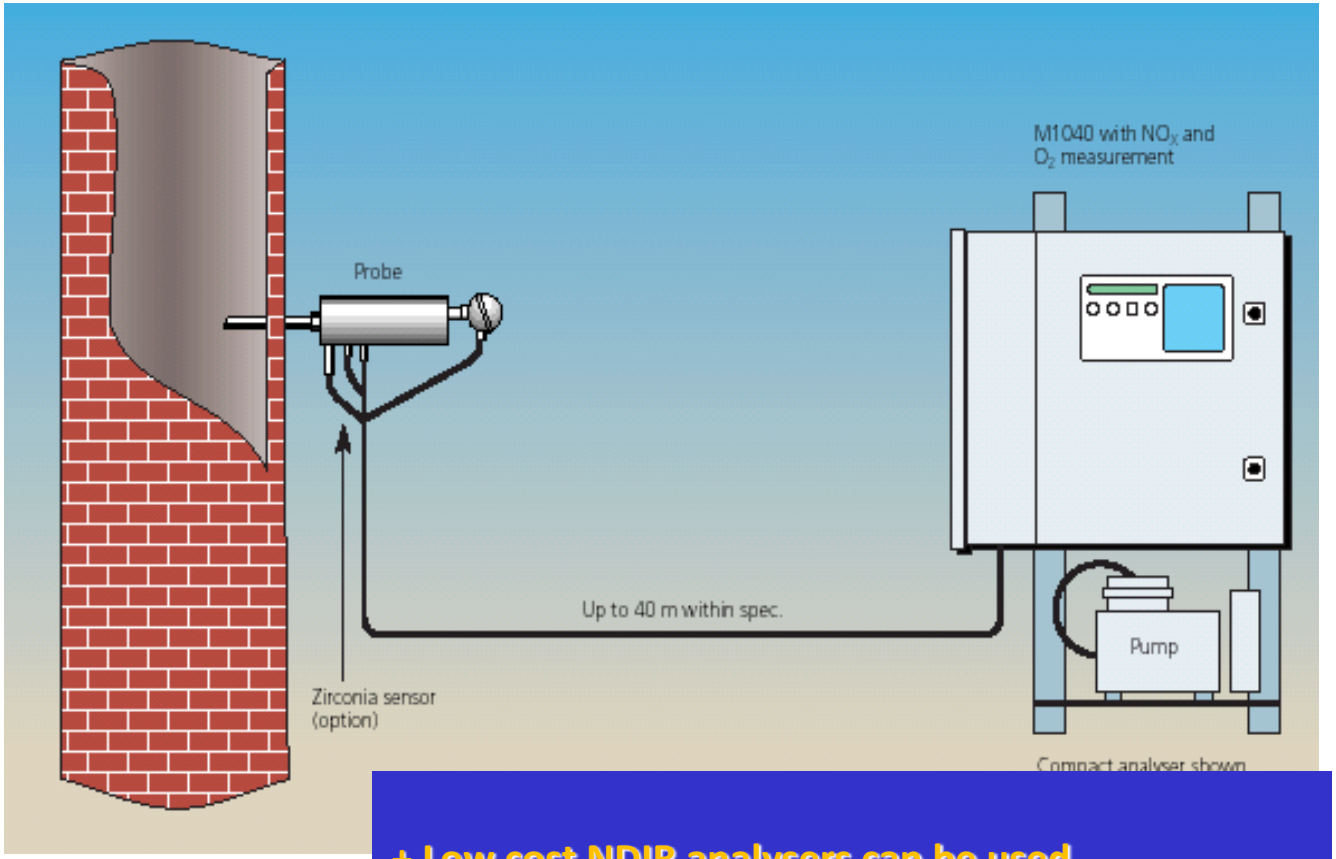
Methods

1. Dry extractive
2. Wet-hot extractive
3. Dilution extractive
4. In Situ Probe Type—diffusion
5. In Situ Cross Stack Type—Spectrometer in A/C Room

Techniques

- DOAS
- FTIR
- IR absorption
- UV absorption
- Chemiluminescense
- UV-fluorescense

Extractive Methods



Dry extractive

+ Low cost NDIR analysers can be used
- Not suitable with high dust loads
-Water removal changes the sample condition

Wet-hot extractive

+ Multigas analysers can be used
- Expensive
- Hot sample requires advanced heating systems
- Sensitive for power failures and high dust loads

Dilution extractive

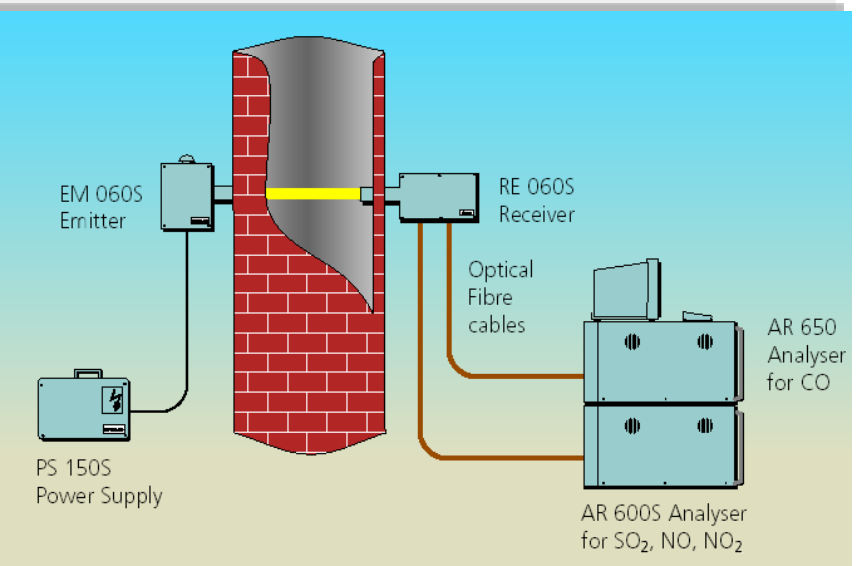
+ Ambient type analysers can be used
+ Sample is dry and clean
+ Low initial cost
- Requires correct dilution
- Not suitable for monitoring low concentrations

In-Situ Methods

In-Situ , Probe Type

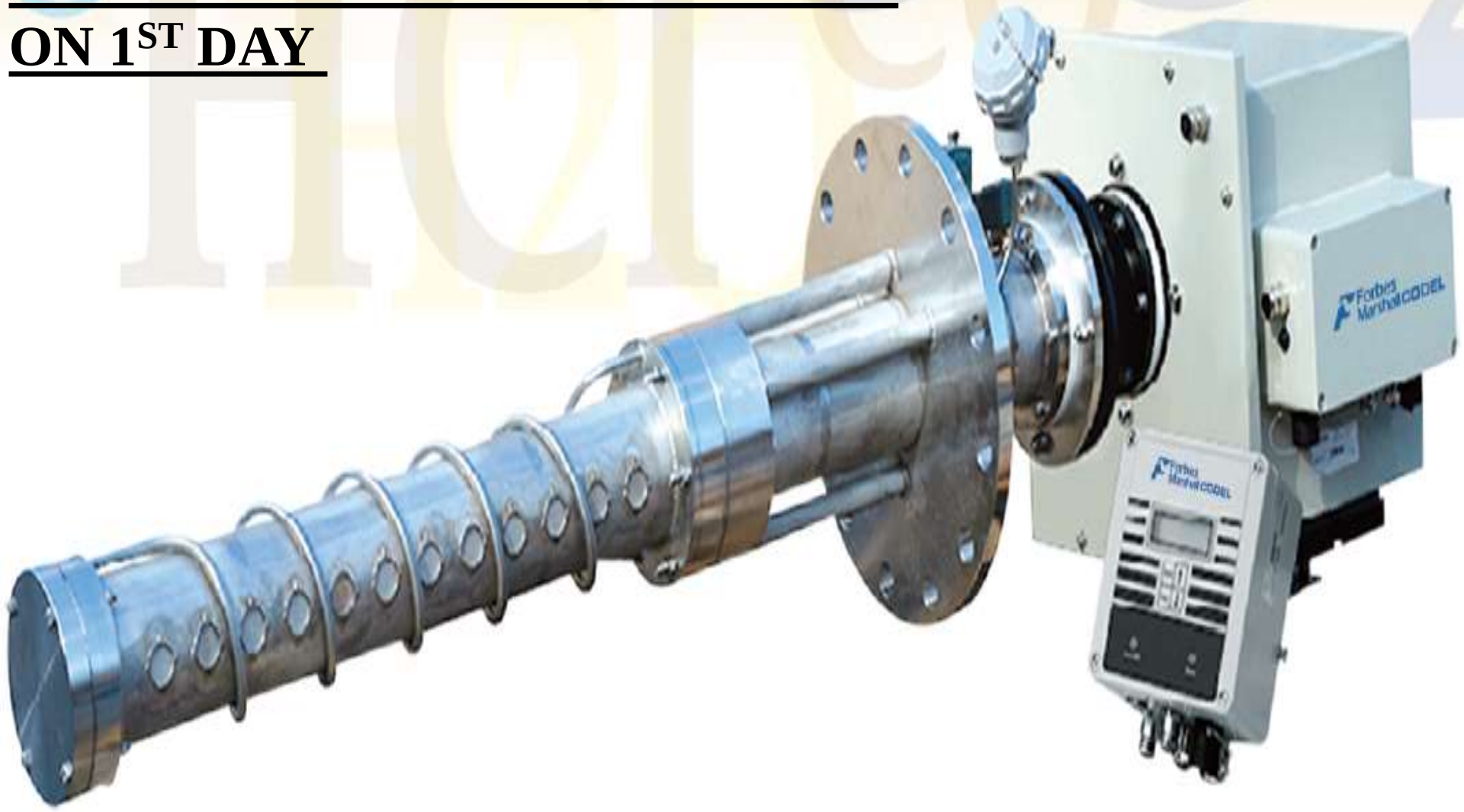
+ Simple installation
+ Low cross interference sensitivity
- Limited number of gases can be monitored
- Some models do not meet US EPA requirements
- Not representative sample
- Analyser stack mounted (vibrations, temperature)

In-Situ, cross-stack (open path)



+ Reliable (analyser not stack mounted (OPSIS)
+ Representable sample
+ Meeting US EPA calibration requirements
+ TUV approved (OPSIS)
+ Several hundreds of references world-wide
- Cross interference possible (non-DOAS systems)

STORY OF INSITU PROBE TYPE ANALYSER ON 1ST DAY



MORE CLOSER LOOK ON THE INSITU PROBE TYPE ANALYSER : SINTERED FILTERS WORKING ON DIFFUSION PRINCIPLE GETTING CHOKED !!!

MECHANISM TO BRING THE ANALYSER TO GROUND LEVEL FOR CLEANING

CLEANING WITH HIGH PURGE AIR :

OPSIS

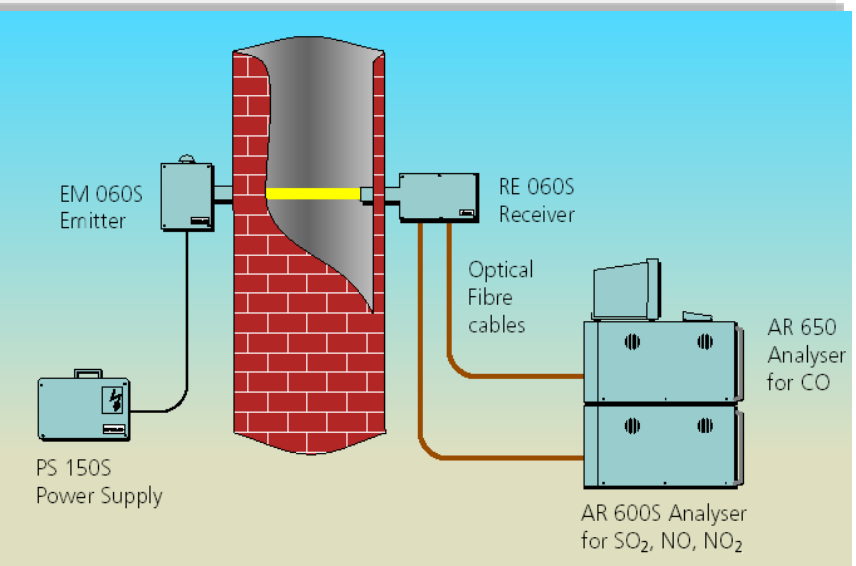
MORE ADVANCED MANUAL CLEANING PROCEDURE WITH SCREW DRIVER & HAMMER

In-Situ Methods

In-Situ , Probe Type

+ Simple installation
+ Low cross interference sensitivity
- Limited number of gases can be monitored
- Some models do not meet US EPA requirements
- Not representative sample
- Analyser stack mounted (vibrations, temperature)

In-Situ, cross-stack (open path)



+ Reliable (analyser not stack mounted (OPSIS)
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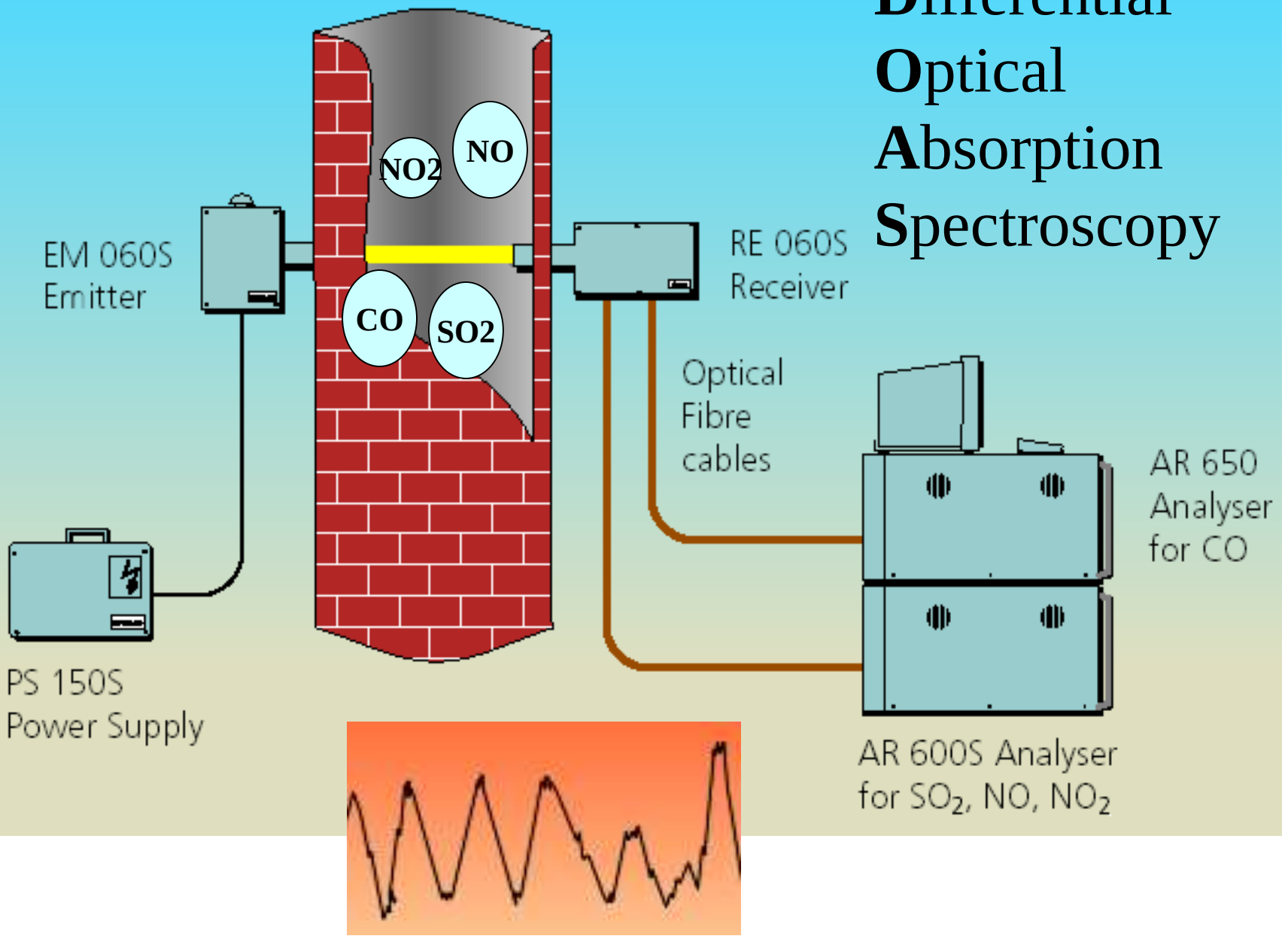
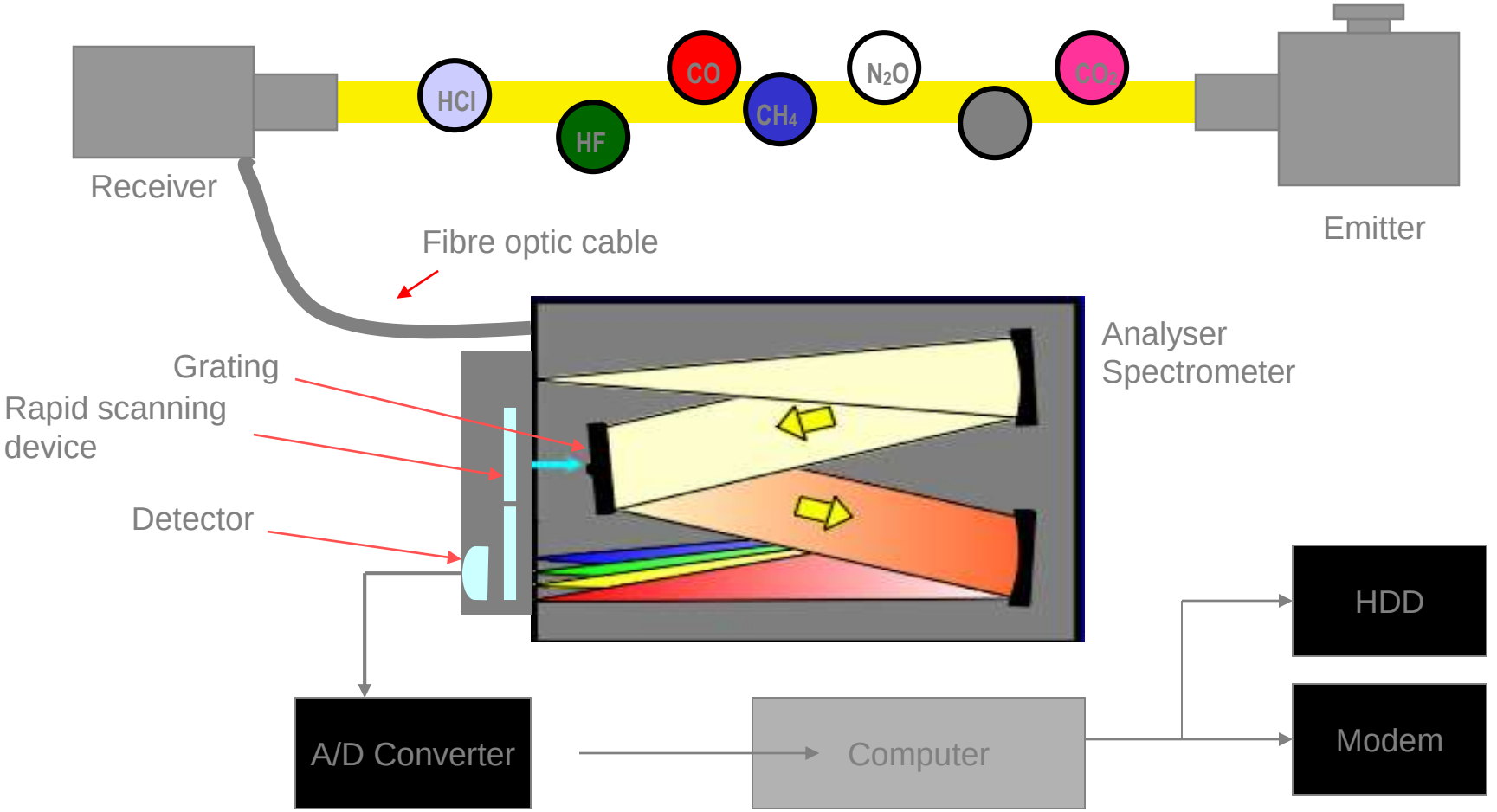
OPSIS TECHNIQUE

Differential
Optical
Absorption
Spectroscopy



ALL UV & IR Gases With UV spectroscopy & IR DOAS TECHNOLOGY

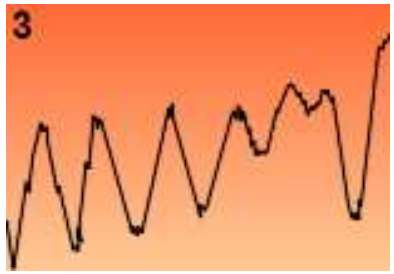
UV analyser schematic



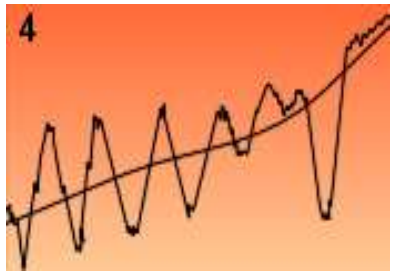
Spectral Evaluation

Raw spectrum

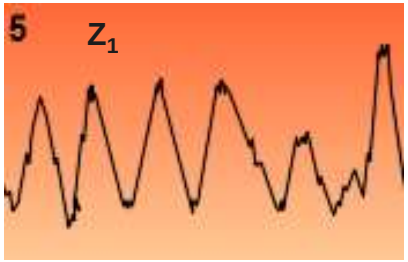
System reference spectrum



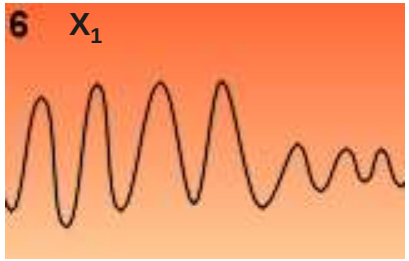
After division 1 by 2

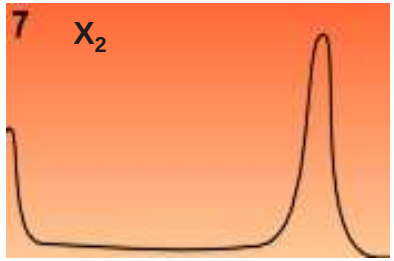


Broadband information is eliminated by matching curve.

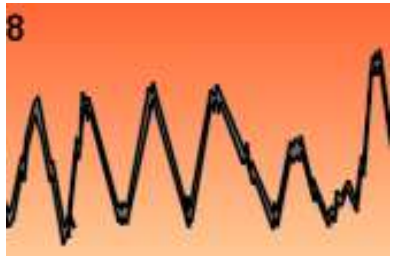


After division by 4 and the matching curve, a differential absorption spectrum





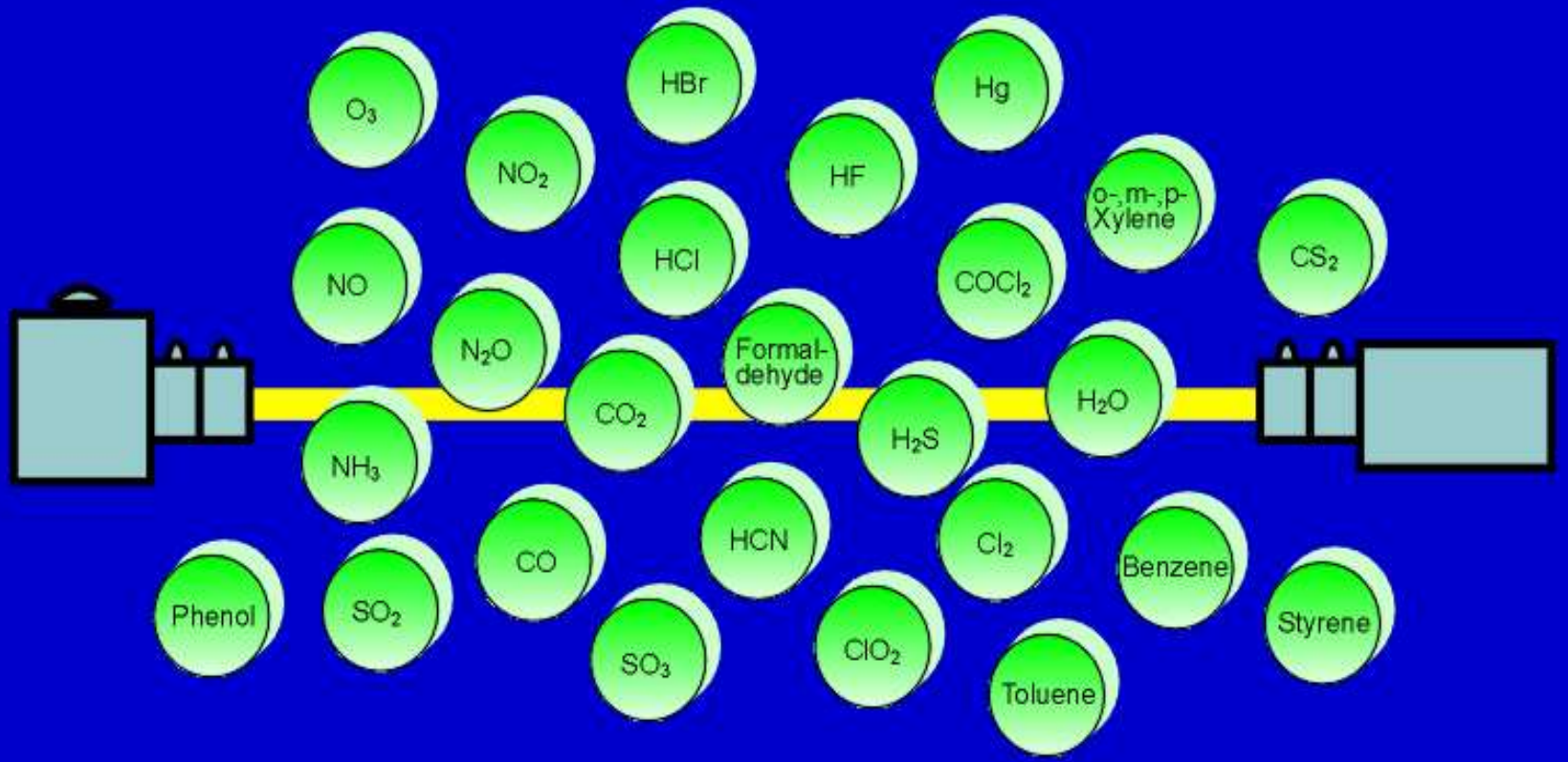
Pre-recorded known spectrum for each gas stored in memory.
$Z_2 = C_1X_1 + C_2X_2$ is calculated for best Match.



Determining the difference between Z_1 and Z_2 curves gives standard deviation.

Gaseous Compounds

Continuous Emission Monitoring



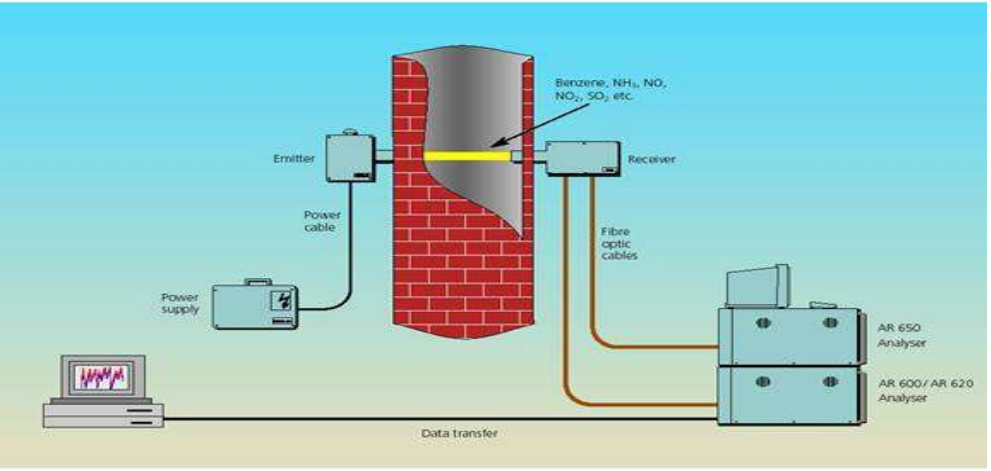
EM2

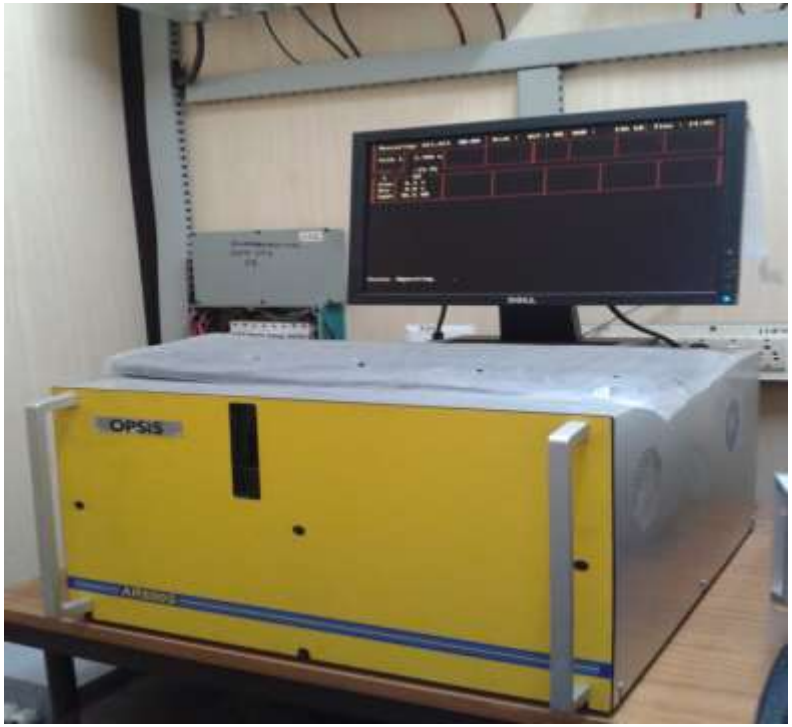
WHAT CAN BE MEASURED

(Detectable in sub-ppb levels)

Criteria pollutants	Aromatic HC	Smelling compounds	Toxic and exotic gases
SO2	Benzene	NH3	Mercury (Hg)
NO2	Toluene	CS2	Phosgene (COCL2)
NO	Styrene	Trimethylamine	Chlorine Dioxide (ClO2)
O3	Ethylbenzene	Formaldehyde	Chlorine (CL2)
	Xylenes	Acetaldehyde	Sulfur Trioxide (SO3)
	Cresols	Phenol	Hydrogene Fluoride (HF)
	Trimethylbenzenes		Hydrogen Chloride (HCL)
	Monochlorbenzene		Hydrogene Cyanide (HCN)
	Dichlorbenzene		Methylisocyanate (MIC)

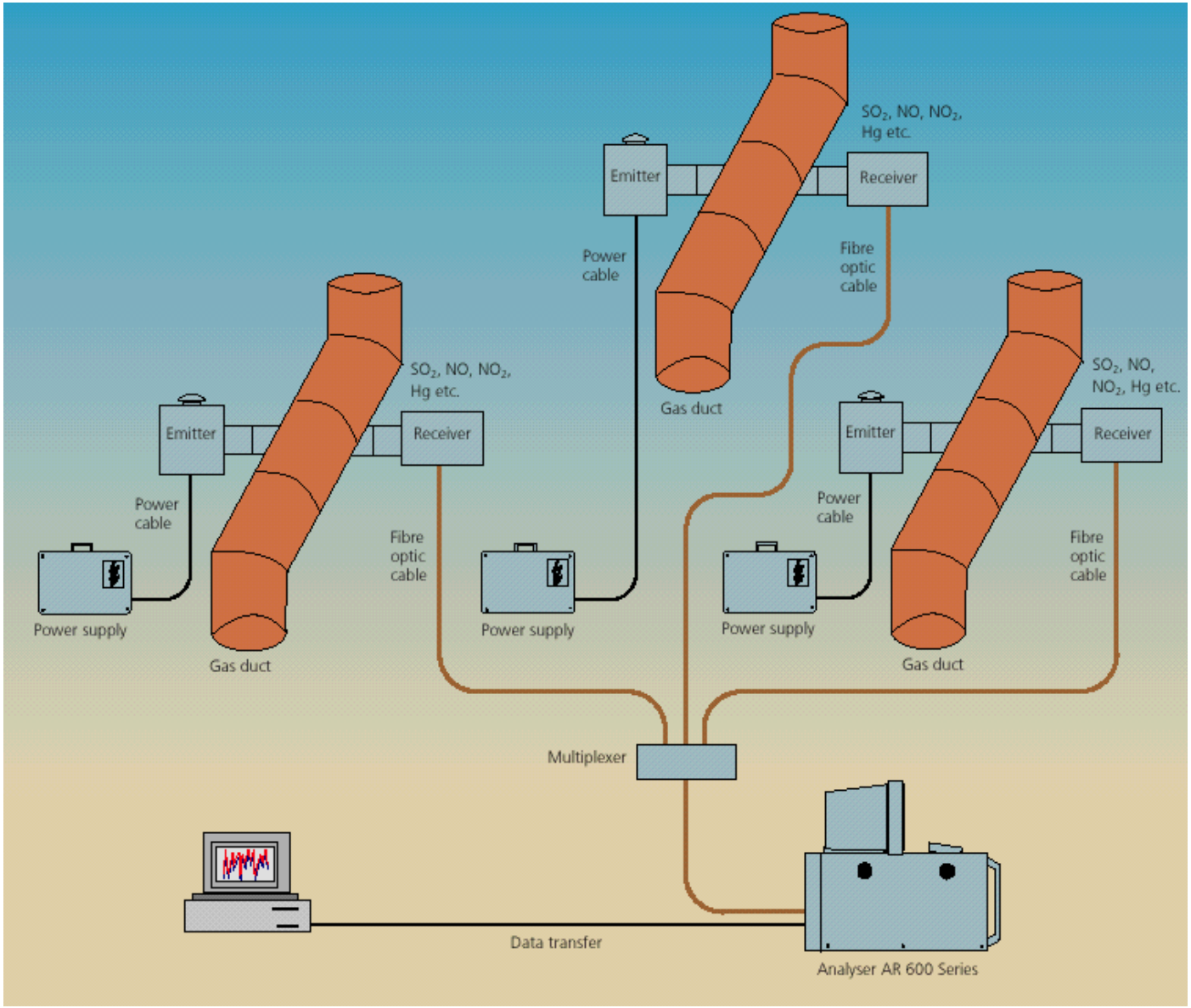
INSITU CROSS STACK TYPE





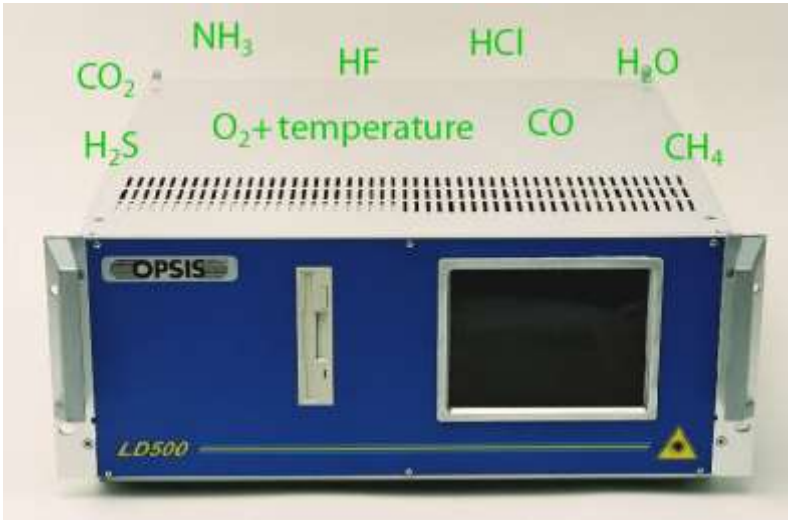
Multi-path Applications

One analyser monitors 6 Ducts



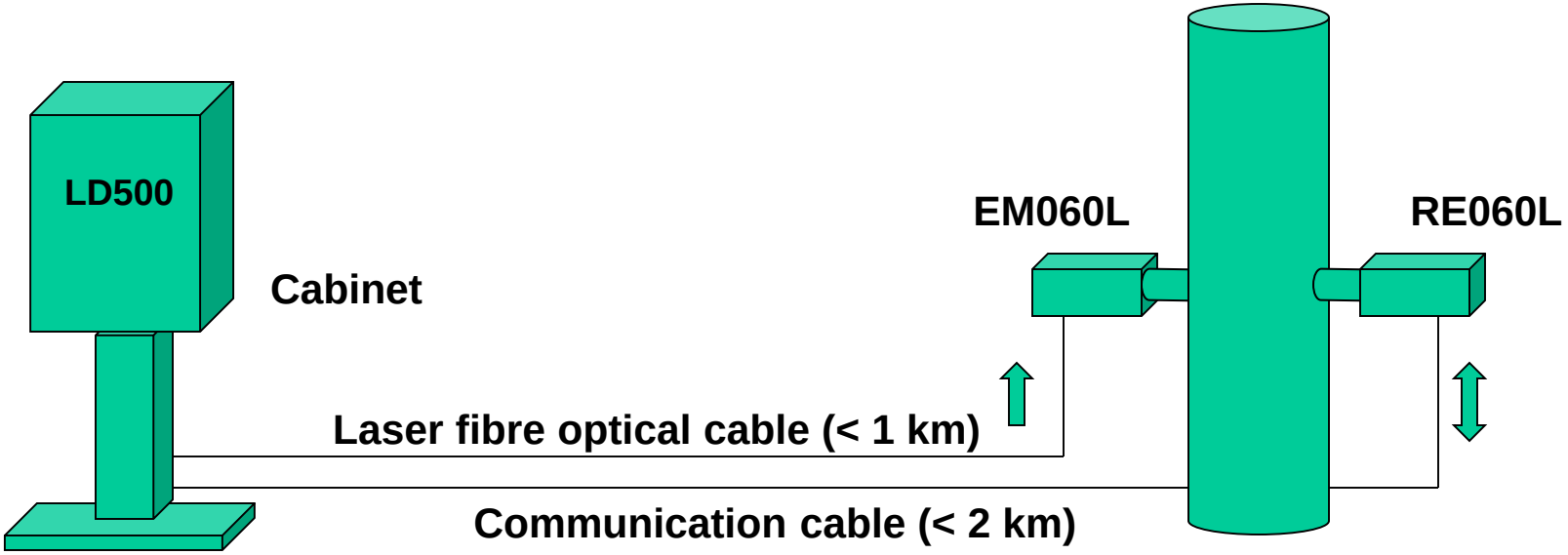
LASER DIODE TECHNOLOGY FOR ONLY IR GASES

LD500 HARDWARE (CEM)

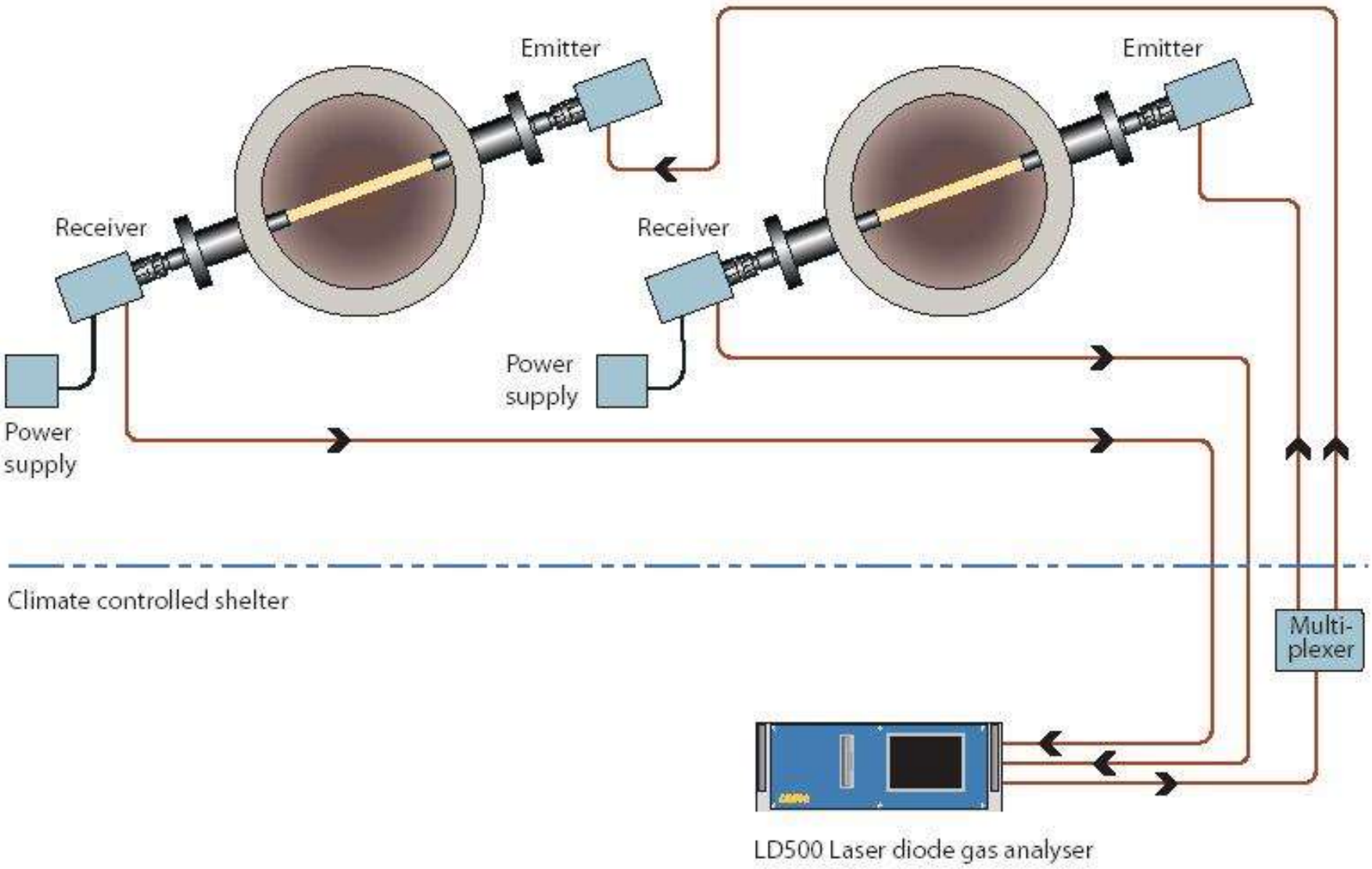


TUNEABLE LASER DIODE ANALYSER

SYSTEM OVERVIEW, CEM

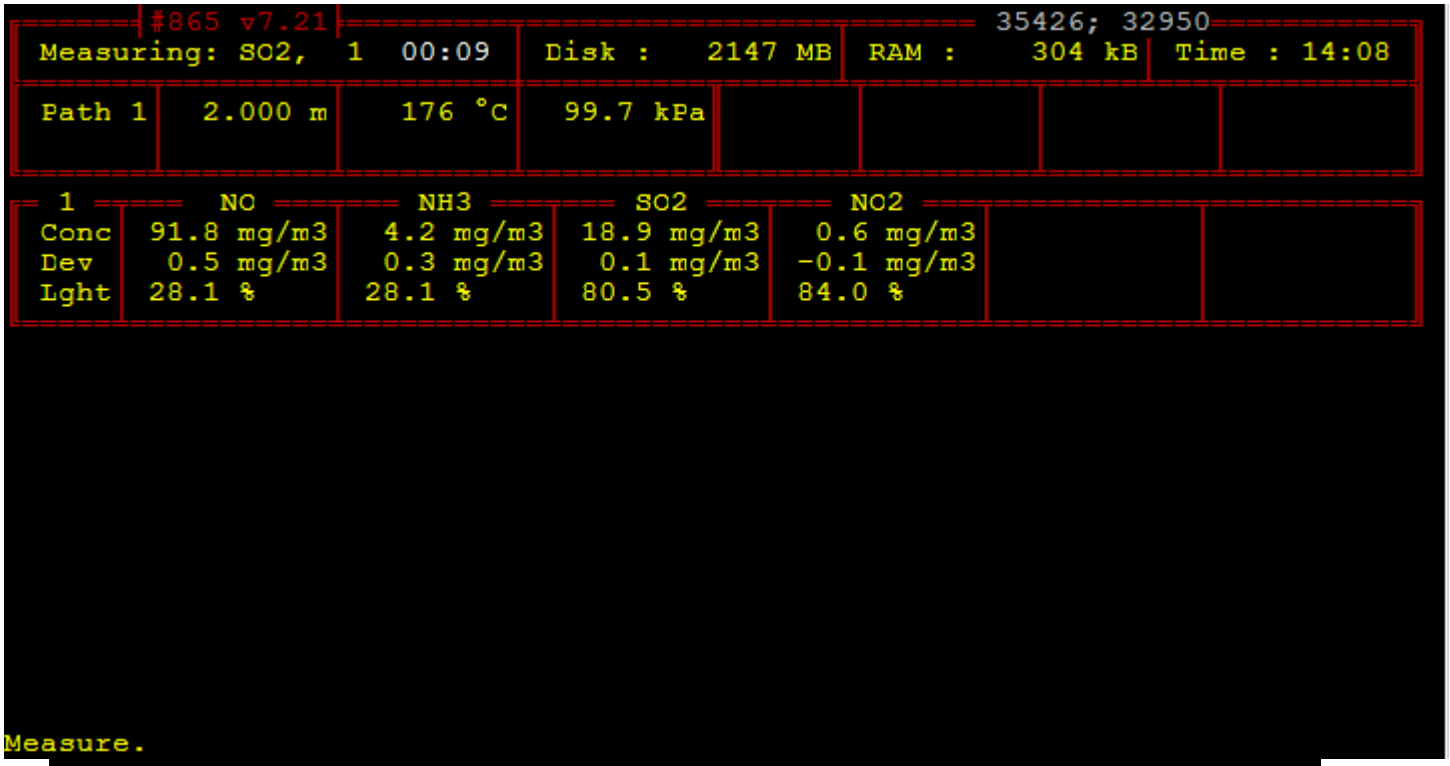


UP TO 8 MONITORING PATHS WITH ONE ANALYSER



Analyser software

Measurement screen



Conc = an averaged value of thousands of measurements
Dev = standard deviation of concentration values
Light = a light intensity value of each gas

Xenon Lamps

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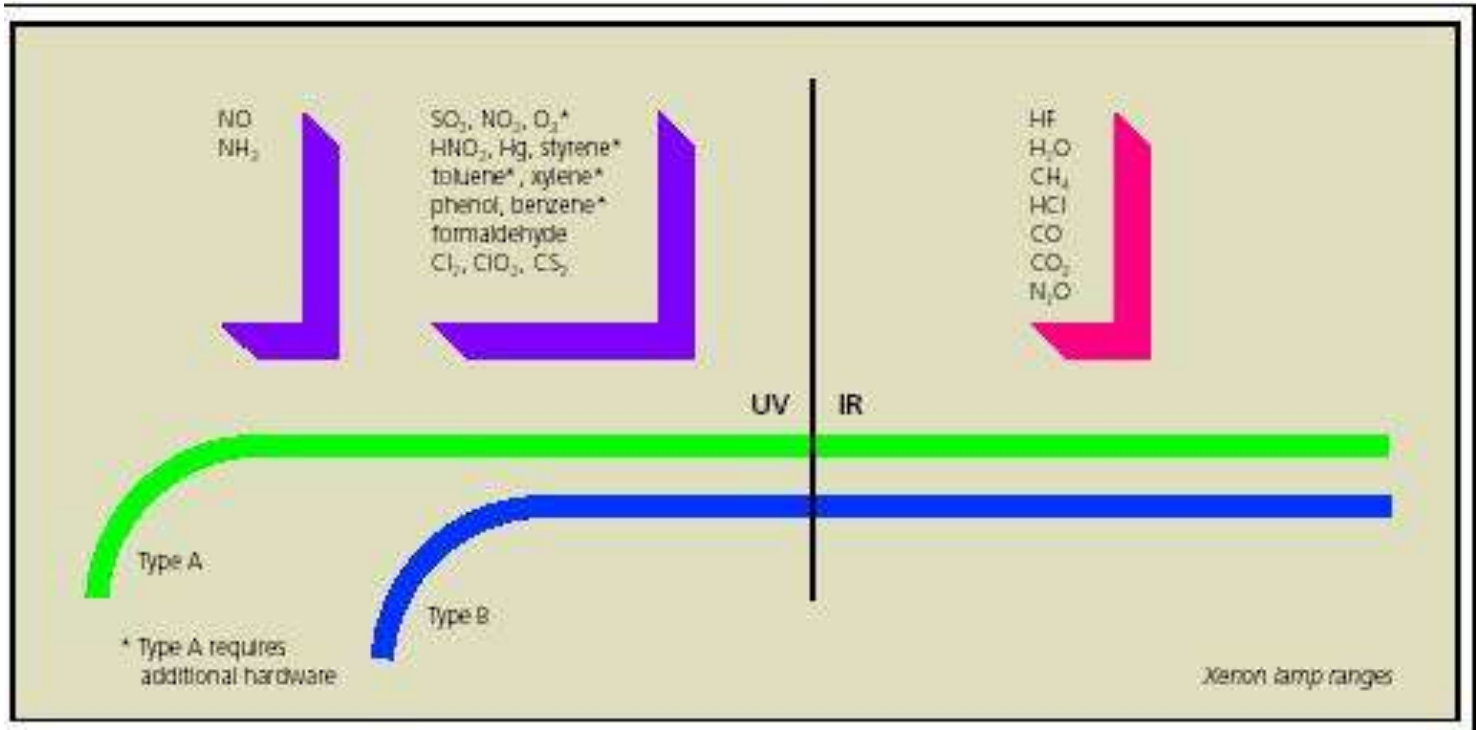


Technical Specifications

Type of lamp	A – 150 W	B – 150 W
Power consumption	150 W	150 W
Current	8.4 (±0.5) A_{DC}	8.4 (±0.5) A_{DC}
Ozone-generating	Yes	No

In-Situ Methods

+ No sampling system
+ Non-contact system
+ Normally multi-gas analysers
+ Low maintenance
+ Low operational costs
+ Long lifetime
- Initial cost

Extractive Methods

+Low initial cost
- High maintenance
- High operational costs
- Short lifetime
- Normally requires individual analysers

❖Gas Compounds : NO,NO2,(NOx), SO2,CO,CO2,NH3 H2O,HCL,HF HG,N2O,NO3,HNO2, BTX,+ 50 more compounds

❖ Upgrade capability for future Gases : Mercury (New CPCB Requirement for Power Plants) possible

❖ Cross Interference : NIL

❖Yearly once Calibration required as the span drift is only +/_ 4% per year

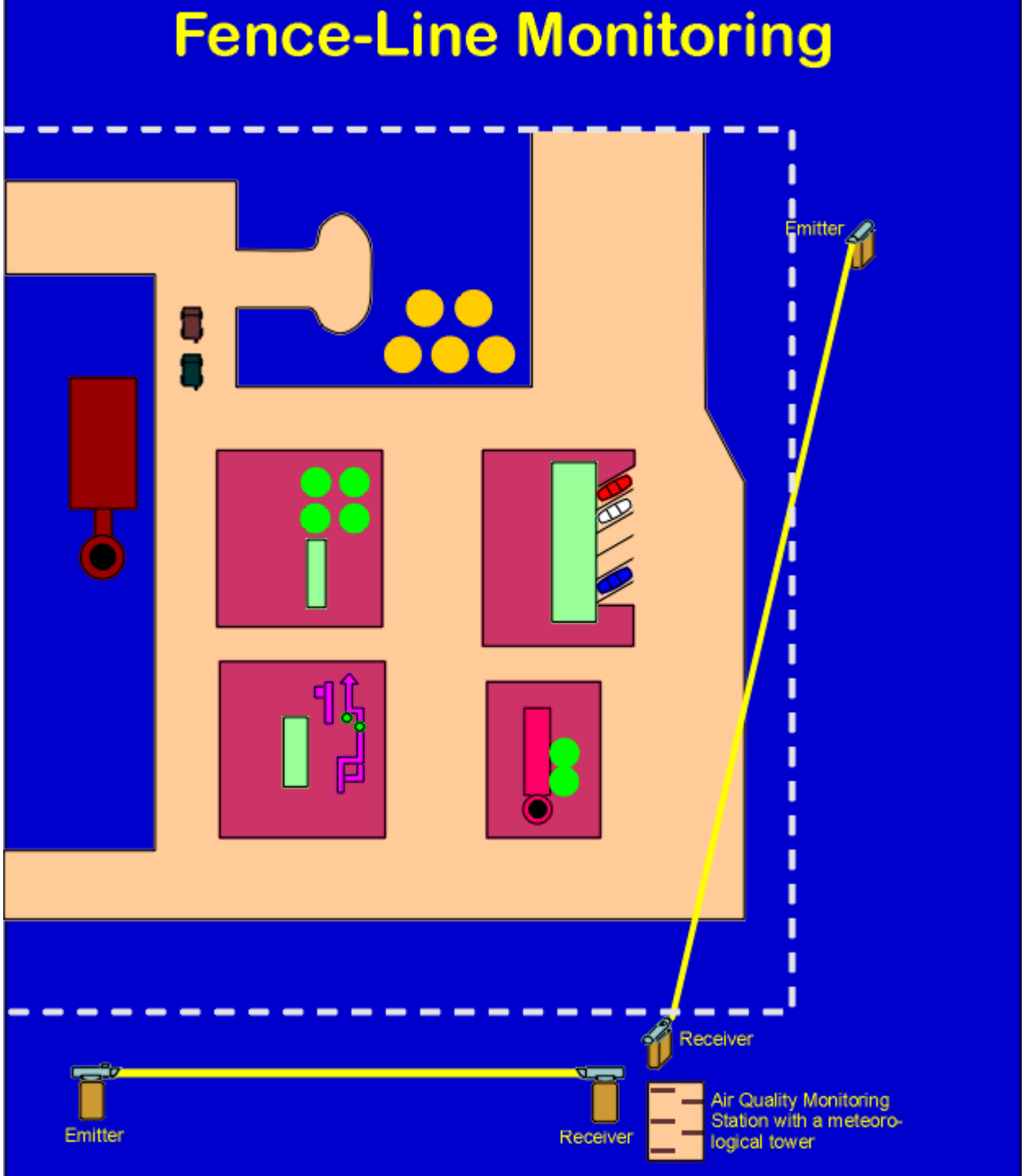
❖High Data Capture Rate of 95-98% justifies meaning of Continuous Monitoring

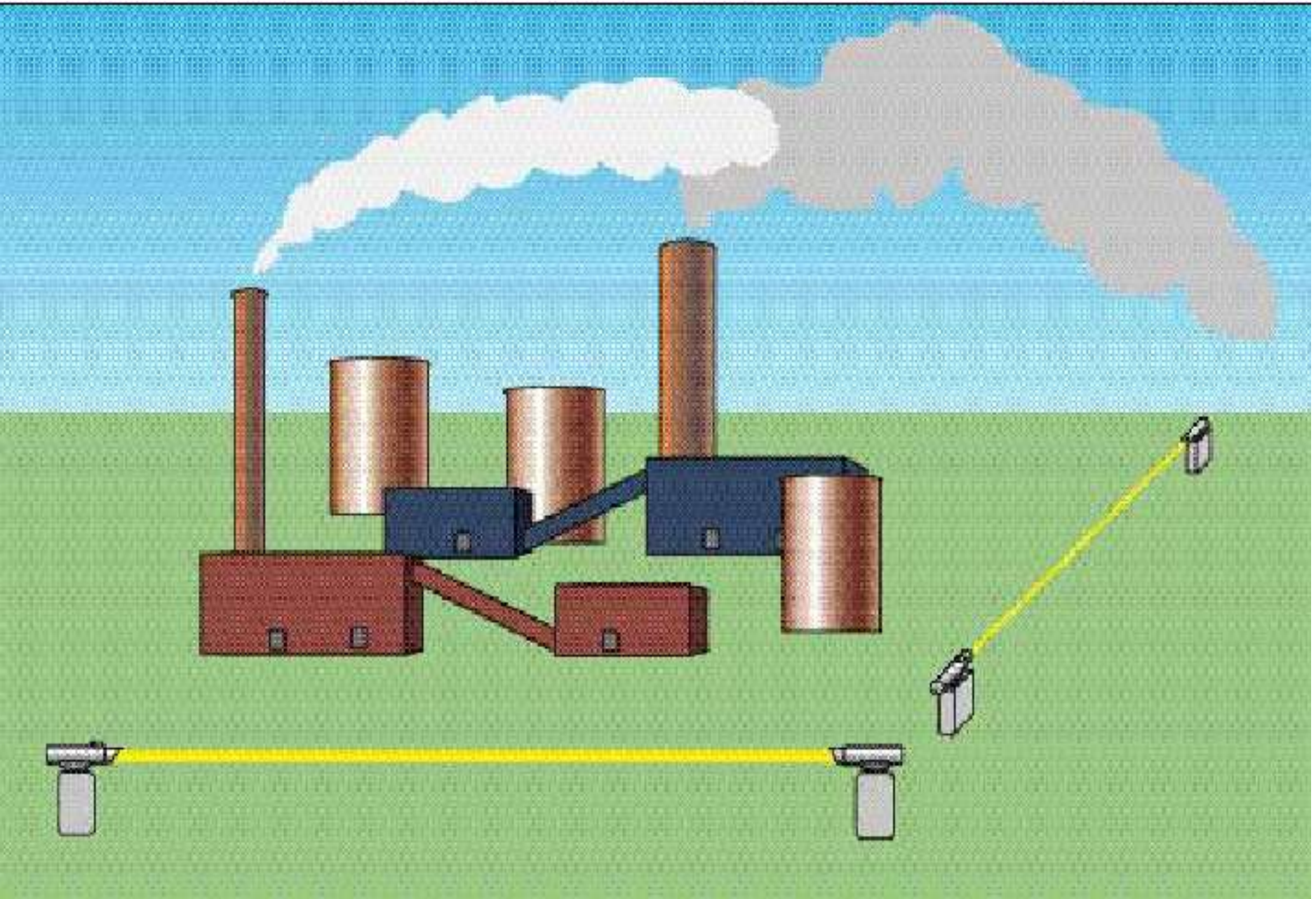
❖True Nox Monitoring Possible As DOAS measures Individually NO & NO2 (No Converter used)

❖Ability to Measure both Ambient & Stack with Same Analyser

❖Power Consumption : 1/3 RD OF AN EXTRACTIVE SYSTEM

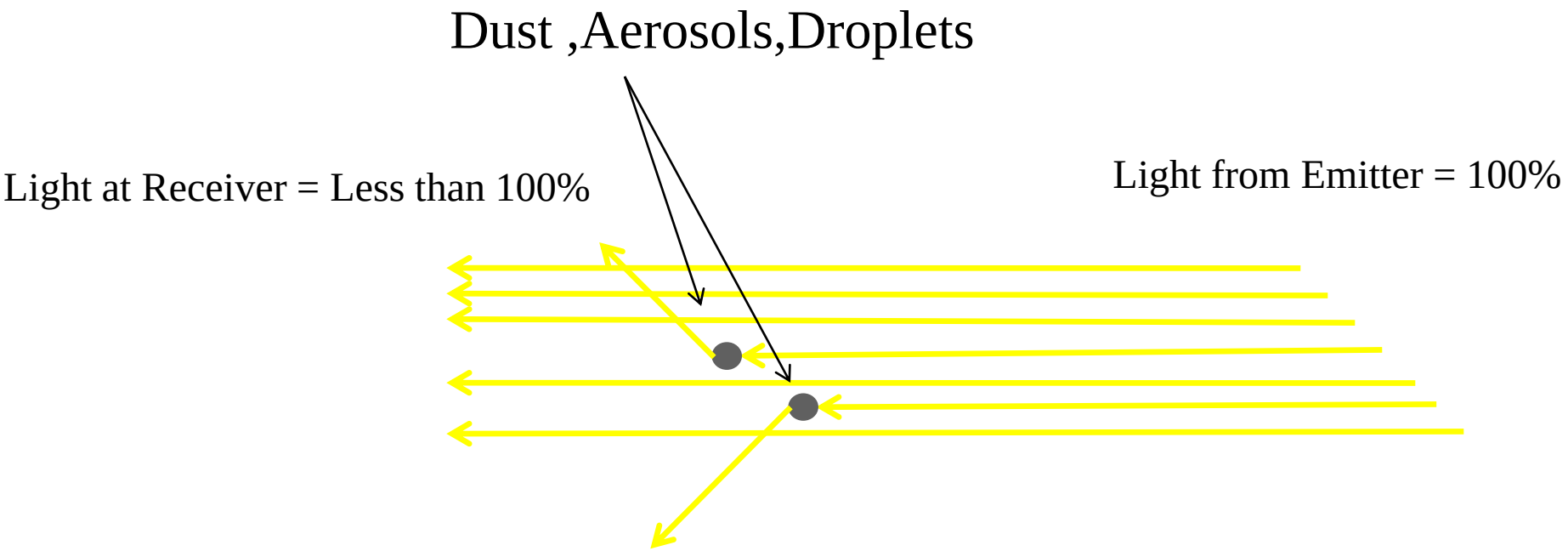
Fence-Line Monitoring



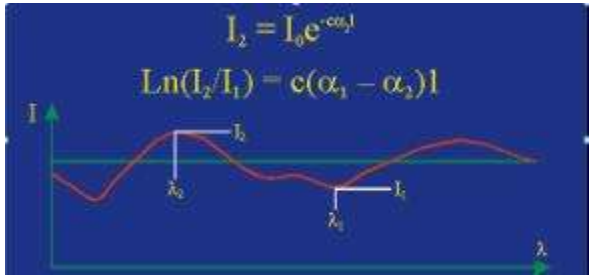


WILL DUST AFFECT THE CROSS STACK DOAS SYSTEM?

RAINDROPS AND PARTICULATE MATTER CAUSING SCATTERING OF LIGHT

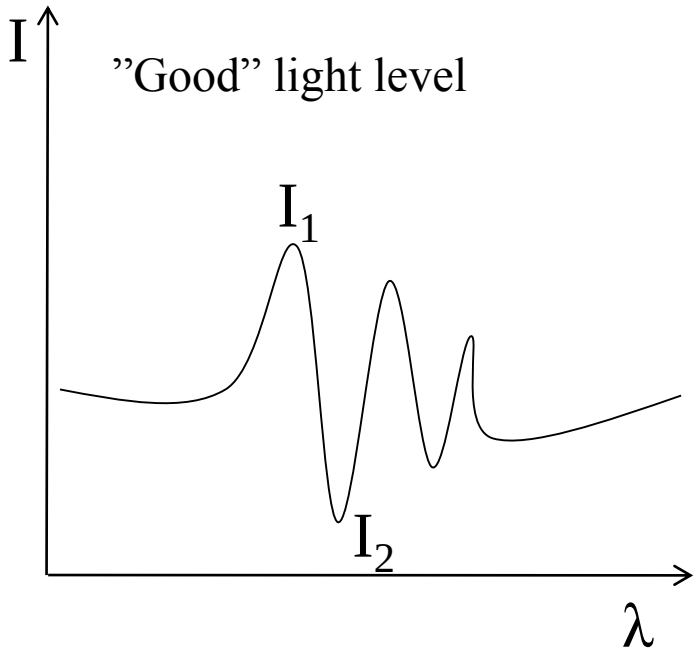


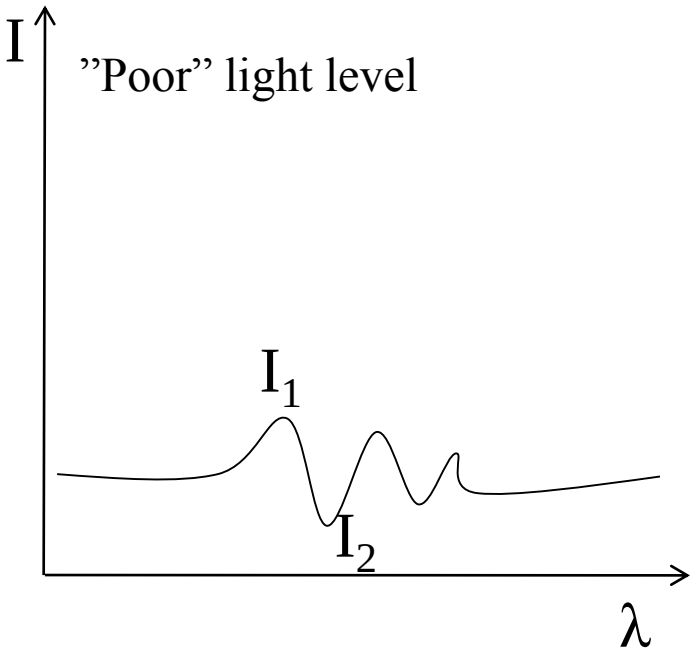
DIFFERENTIAL ABSORPTION



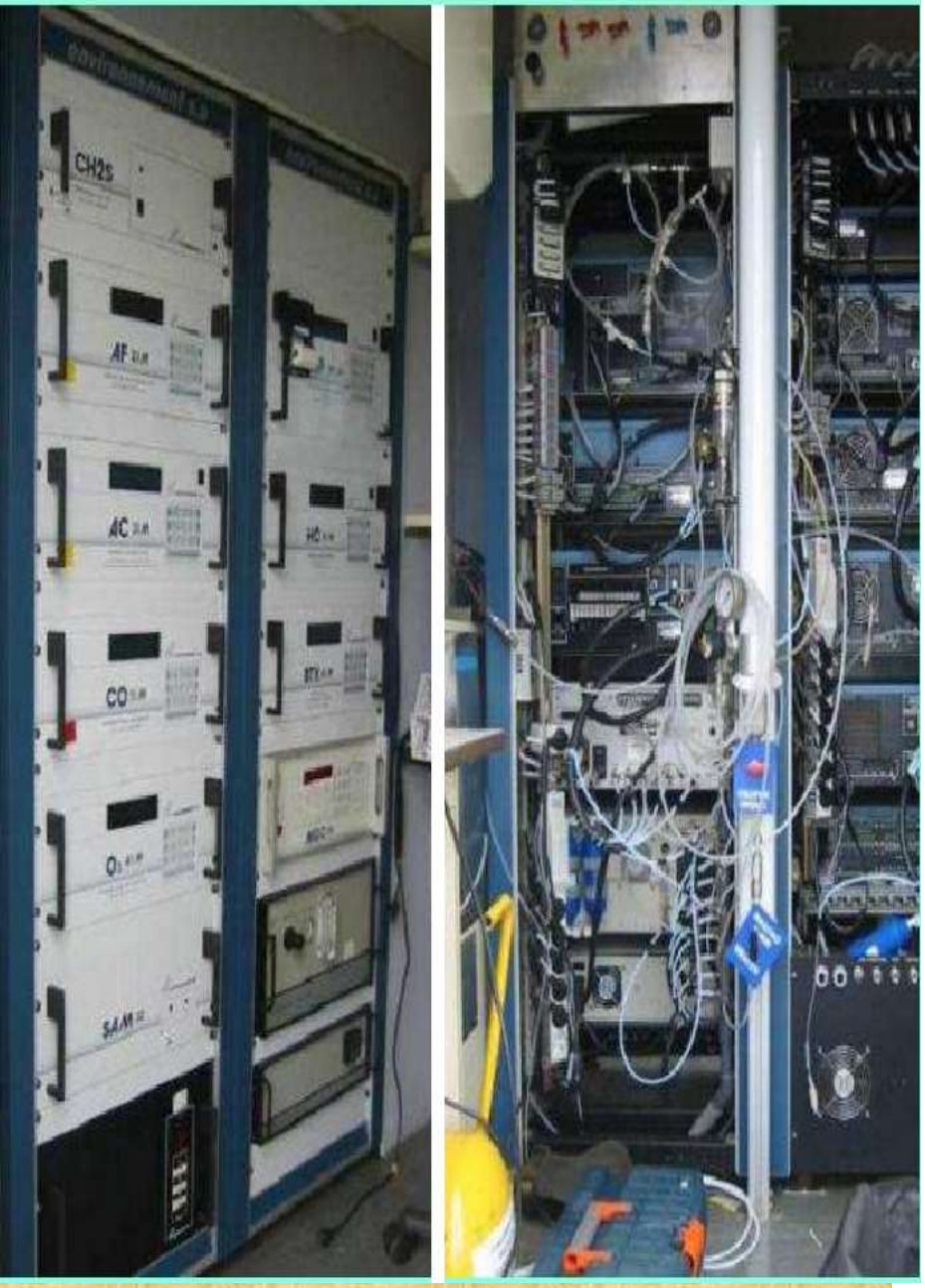
The Differential Absorption remains the same , whatever the total light level is !

I_1/I_2 (”Good”) = I_1/I_2(”Poor”)



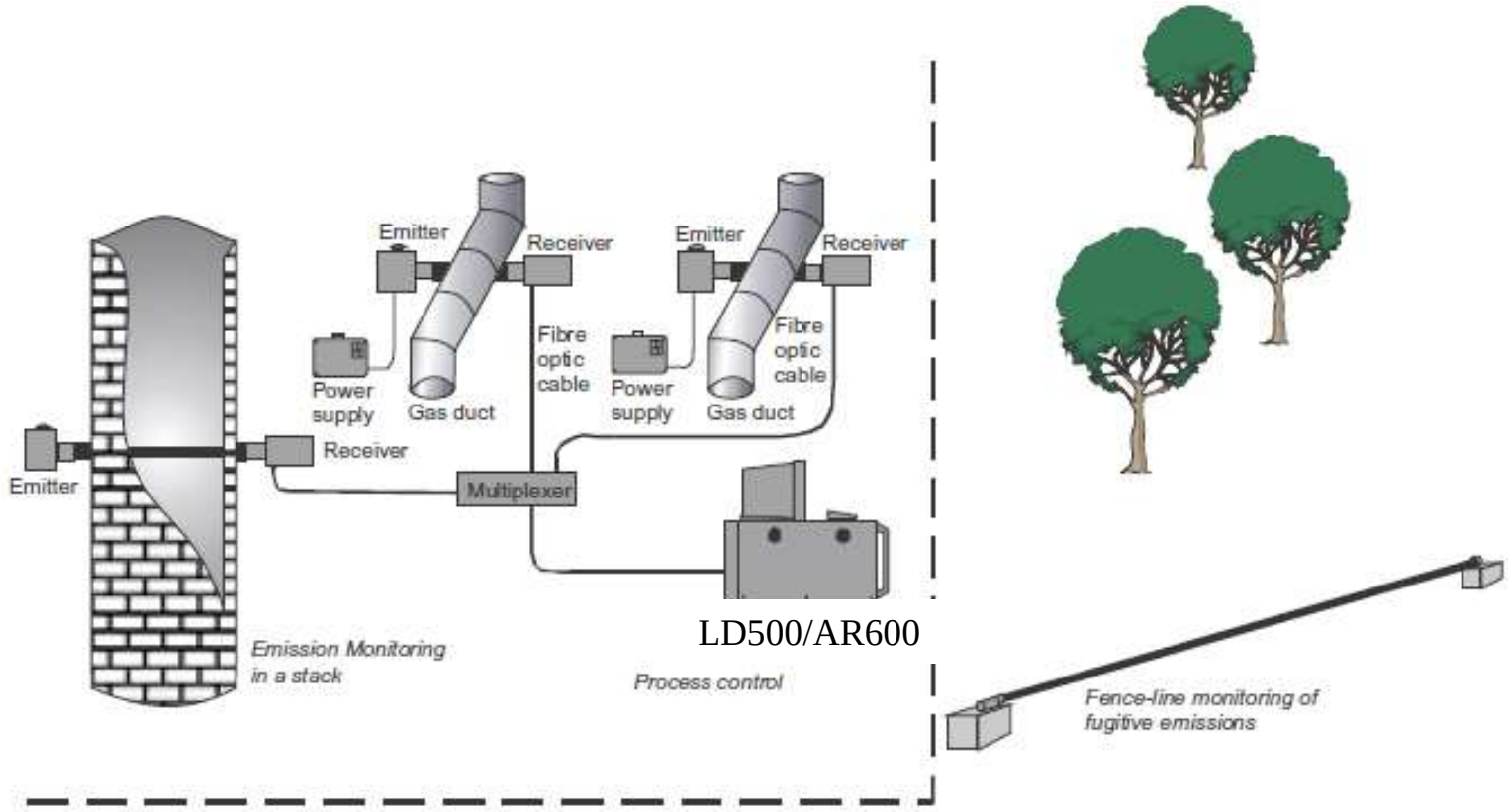


- **EXTRACTIVE MONITORING**



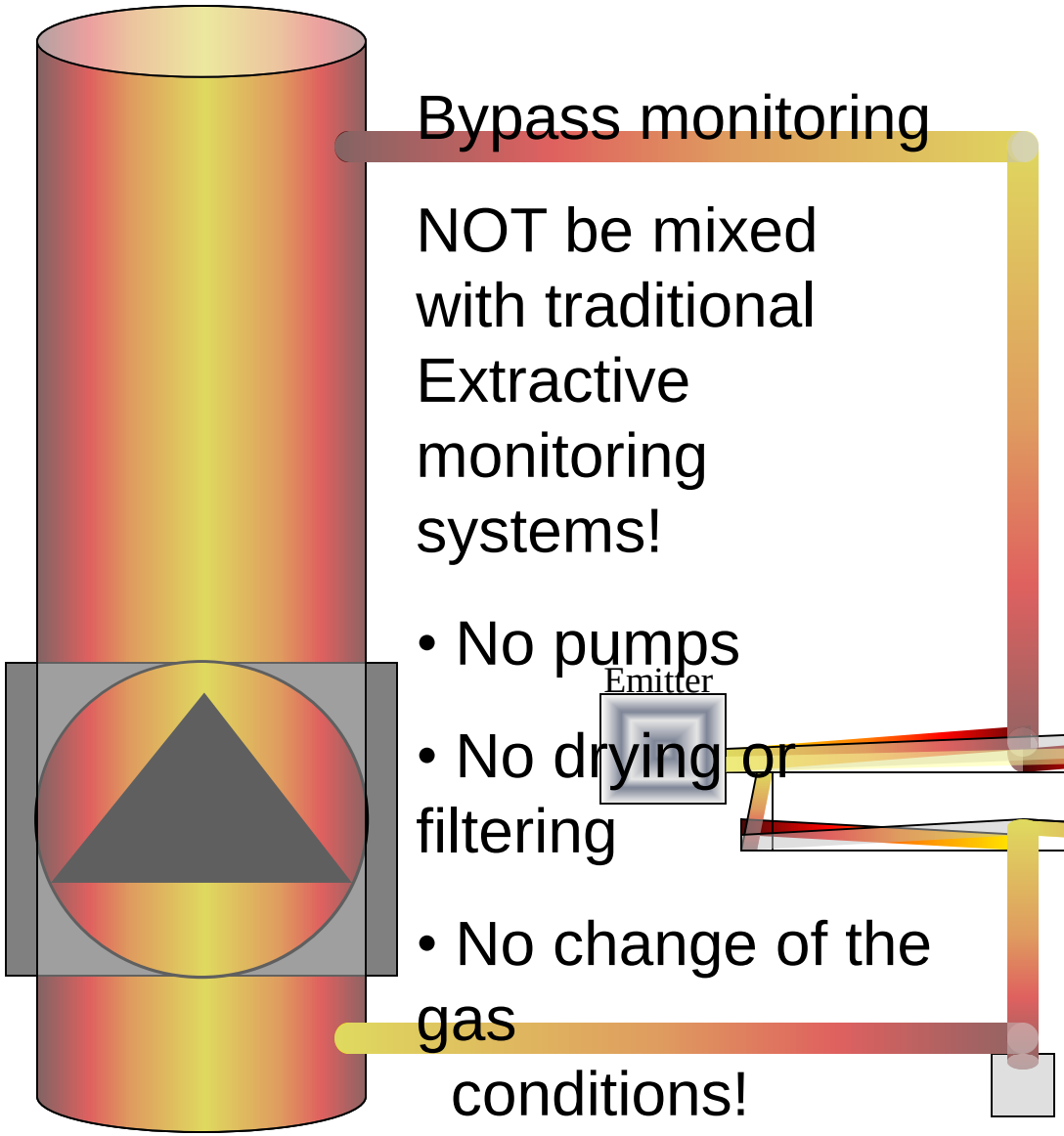
INSITU CROSS STACK

Monitoring AQM, CEM and Process using one analyser



The Opsis system is designed for process controll, emissions monitoring and fence-line monitoring of fugetive emissions at and around a fertilizer plant.

FASTLOOP SYSTEM : *The "Alternative" path*



Bypass monitoring

NOT be mixed with traditional Extractive monitoring systems!

- No pumps
- No drying or filtering
- No change of the gas conditions!

The "Fastloop" Concept

We do NOT change the gas content. We are just moving the measuring point!

OPSIS

Performance Data (additional compounds can be monitored)

Compound	Max. measurement range (typical) (1 m path)[1]	Lowest TÜV approved measurement range	Min. detectable quantities (monitoring path 1 m, measurement time 30 sec.)	Zero drift (1 m path, max. per month)[6]	Span drift (per month, better than)	Linearity error (of measurement range, better than)	Max. length of fibre optic cable (when monitoring individual compounds)[5]	Hardware requirement
AR600/AR620 Analyser								
NO[2]	0–2000 mg/m³	0–150 mg/m³	1 mg/m³	±2 mg/m³	±2%	±1%	10 m	AR600/620
NO_2	0–2000 mg/m³	0–20 mg/m³	1 mg/m³	±2 mg/m³	±2%	±1%	200 m	AR600/620
SO_2	0–5000 mg/m³	0–80 mg/m³	1 mg/m³	±2 mg/m³	±2%	±1%	100 m	AR600/620
NH_3[3]	0–1000 mg/m3	0–10 mg/m³	0.5 mg/m³	±1 mg/m³	±2%	±1%	10 m	AR600/620
Hg[10]	0–1000 µg/m3	0–150 µg/m³	1 µg/m³	±2 µg/m³	±2%	±1%	50 m	AR600/620
H_2O	0–100% Vol.	0–30% Vol.	0.5% Vol.	±1% Vol.	±2%	±1%	100 m	AR620
HCl	0–10000 mg/m³	—	10 mg/m³ [4]	±20 mg/m³ [4]	±2%	±1%	50 m	AR620
HF	0–1000 mg/m³	—	5 mg/m³	±10 mg/m³	±2%	±1%	200 m	AR620
CO_2	0–100% Vol.	—	0.5% Vol.	±1% Vol.	±2%	±1%	50 m	AR620
Benzene	0–1000 mg/m³	—	1 mg/m³	±2 mg/m³	±2%	±1%	25 m	AR600/620
AR650 Analyser								
HCl	0–5000 mg/m³	0–15 mg/m³	1 mg/m³	±2 mg/m³	±2%	±1%	50 m	AR650
CO	0–10000 mg/m³	0–75 mg/m³	3 mg/m³	±6 mg/m³	±2%	±1%	10 m	AR650
H_2O	0–100% Vol.	0–30% Vol.	0.1% Vol.	±0.2% Vol.	±2%	±1%	100 m	AR650
HF	0–1000 mg/m³	5 mg/m³	0.1 mg/m³	±0.2 mg/m³	±2%	±1%	200 m	AR650
NH_3	0–1000 mg/m³	—	2 mg/m³	±4 mg/m³	±2%	±1%	200 m	AR650
N_2O[7]	0–10000 mg/m³	—	5 mg/m³	±10 mg/m³	±2%	±1%	50 m	AR650
CH_4	0–10000 mg/m³	—	1 mg/m³	±2 mg/m³	±2%	±1%	100 m	AR650
CO_2	0–100% Vol.	—	0.1% Vol.	±0.2% Vol.	±2%	±1%	50 m	AR650
Br_2	0–10000 mg/m³	—	5 mg/m³	±10 mg/m³	±2%	±1%	100 m	AR650
I_2	0–10000 mg/m³	—	5 mg/m³	±10 mg/m³	±2%	±1%	100 m	AR650
LD500 Laser Diode Gas Analyser								
HCl	0–5000 mg/m³	—	0.5 mg/m³	±1 mg/m³	±2%	±1%	500 m*	LD500
CO	0–100% Vol.	—	0.1% Vol.	±0.2% Vol.	±2%	±1%	500 m*	LD500
H_2O	0–100% Vol.	—	0.1% Vol.	±0.2% Vol.	±2%	±1%	500 m*	LD500
HF	0–5000 mg/m³	—	0.05 mg/m³	±0.1 mg/m³	±2%	±1%	500 m*	LD500
NH_3	0–5000 mg/m³	—	0.5 mg/m³	±1 mg/m³	±2%	±1%	500 m*	LD500
CO_2	0–100% Vol.	—	0.1% Vol.	±0.2% Vol.	±2%	±1%	500 m*	LD500
O_2	0–21%	—	0.1% Vol.	±0.2% Vol.	±2%	±1%	500 m*	LD500
CH_4	0–10000 mg/m³	—	1 mg/m³	±2 mg/m³	±2%	±1%	500 m*	LD500

[1] This data refers to a light path of 1 m. For longer paths the maximum range is proportionally smaller. Products are available to create shorter paths in very wide stacks.
[2] Maximum SO_2 concentration 5 g/m³ × m.
[3] Maximum SO_2 concentration 500 mg/m³ × m.
[4] Monitoring path 5 m, measurement time 30 seconds.
[5] When monitoring several compounds, the shortest fibre optic cable given by the set of components (refer to product sheet P9) has to be used.
[6] For AR650 the same values are valid as maximum zero drift per year.
[7] Detection limit of 1 mg/m³ is optional with hardware upgrade.

* Laser and communikation cables.
- Recommended monitoring path length: 1 to 5 m.
- After wet scrubbers or when particulate concentration averaged over 1 m is higher than 5 g/m³, the monitoring path length may have to be reduced.
- Accuracy is better than 2% of measured value or equal to the detection limit (whichever is the greater).

Multiplexer , 6 paths

Optical fibre cables from the different ducts

One analyser monitors 6 points

TESTS AND APPROVALS

TEST AND APPROVALS

1. **U.S.--E.P.A.---ENVIRONMENTAL PROTECTION AGENCY ,U.S.A.**
2. **TUV ,GERMANY**
3. **MCERTS -SIRA CETRIFICATION SERVICES, U.K.**
4. ENVIRONMENTAL MANAGEMENT CORPORATION,KOREA
5. NATA SCOPE OF ACCREDIATION, AUSTRALIA
6. PATTERN APPROVAL,CHINA
7. ALL-UNION METEROLOGY REASEARCH INSTITUTE,MOSCOW
8. BUREAU VERITAS, U.K.
9. UNDERWRITERS LABORATORIES INC,U.S.A.
10. C.N.R.INSTITUTO INQUINAMENTO ATMOSFERICO,ROME,ITALY
11. INERIS,FRANCE
12. ENVIRONMENT INSTITUTE,JOINT REASEARCH CENTRE,(ISPRA) ITALY

13. EMC,SWEDEN
14. ROMANIAN BEAURE OF LEGAL METROLOGY ,ROMANIA
15. UMEG ,GERMANY
16. METROLOGY INSTITUTE,BULGARIA
17. RUSSIAN APPROVAL AGENCY,RUSSIA
18. LATVIAN HYDROMETROLOGICAL AGENCY,LATVIA
19. BELARUS APPROVAL AGENCY --REPUBLIC OF BELARUS

INSTALLATION

&

USER LIST--CEMs

SGS ANALYSER AR600 SO2

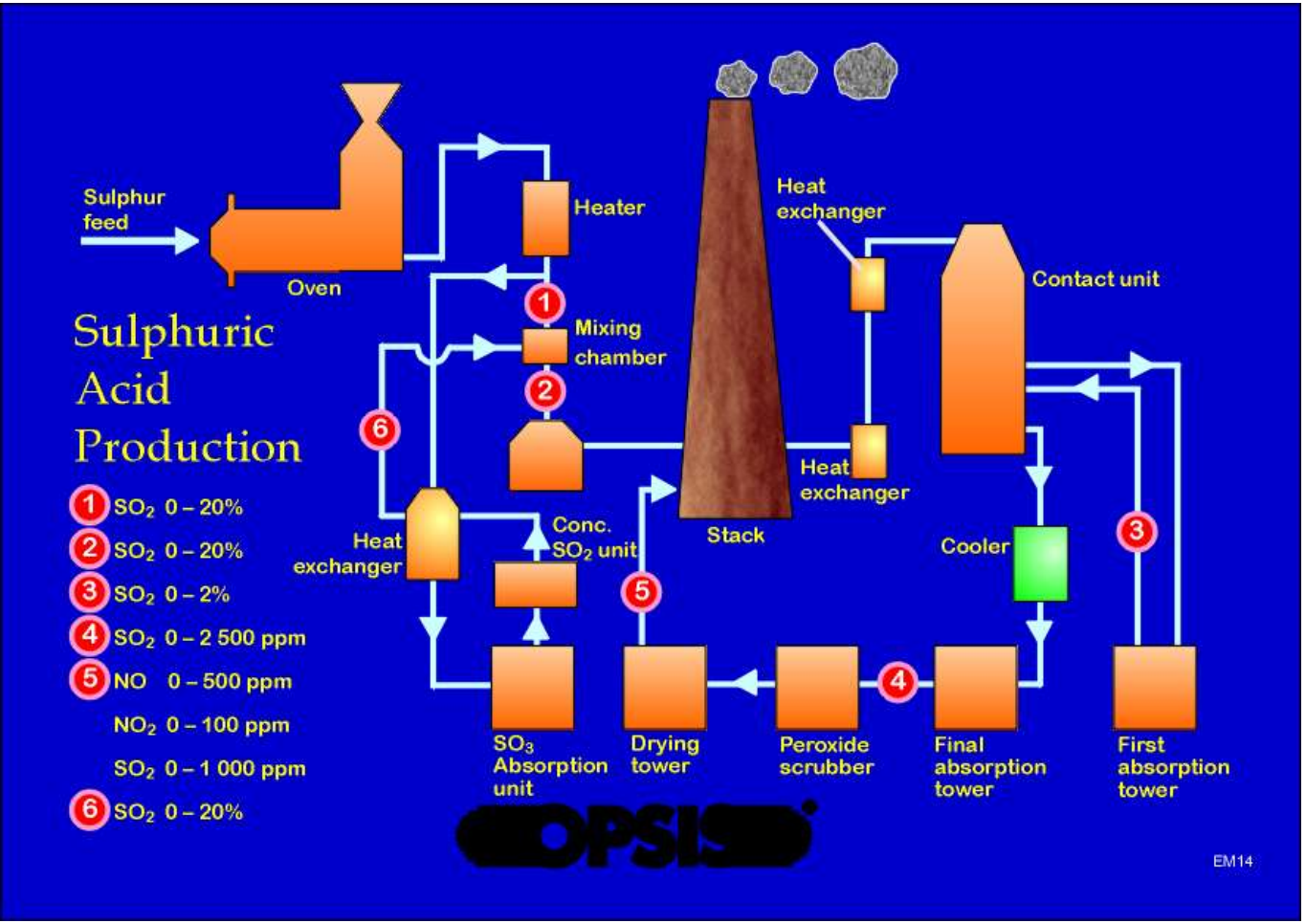
SGS STACK RECEIVER

Approx routing of fast loop tube

COMPLETE FAST LOOP CELL

KEMIRA SULPHURIC ACID PLANT,SWEDEN

The Kemira plant



One analyser used for monitoring 6 locations !

No sampling system or gas conditioning!

In operation for almost 20 years !

Some Smelter & Acid Plants using Opsis

Mount Isa Mines, Australia, Cupper Smelter, SO2, converter off gas, process control, 5 paths

Western Mining, Australia, Zink/Cupper Smelters, Acid Plant, SO2 process and emission, 3 paths

Pasminco, Australia, Zink smelter, SO2 emissions

Kemira, Sweden , Sulfuric Acid Plant, SO2 process and emissions, 6 paths.

LG Nikko Old Plant, South Korea , Cupper Smelter off gases, Acid Plant, process and emission, 4 paths

LG Nikko New Plant, South Korea , Cupper/Zink Smelter off gases, Acid Plant, process and emission, 4 paths

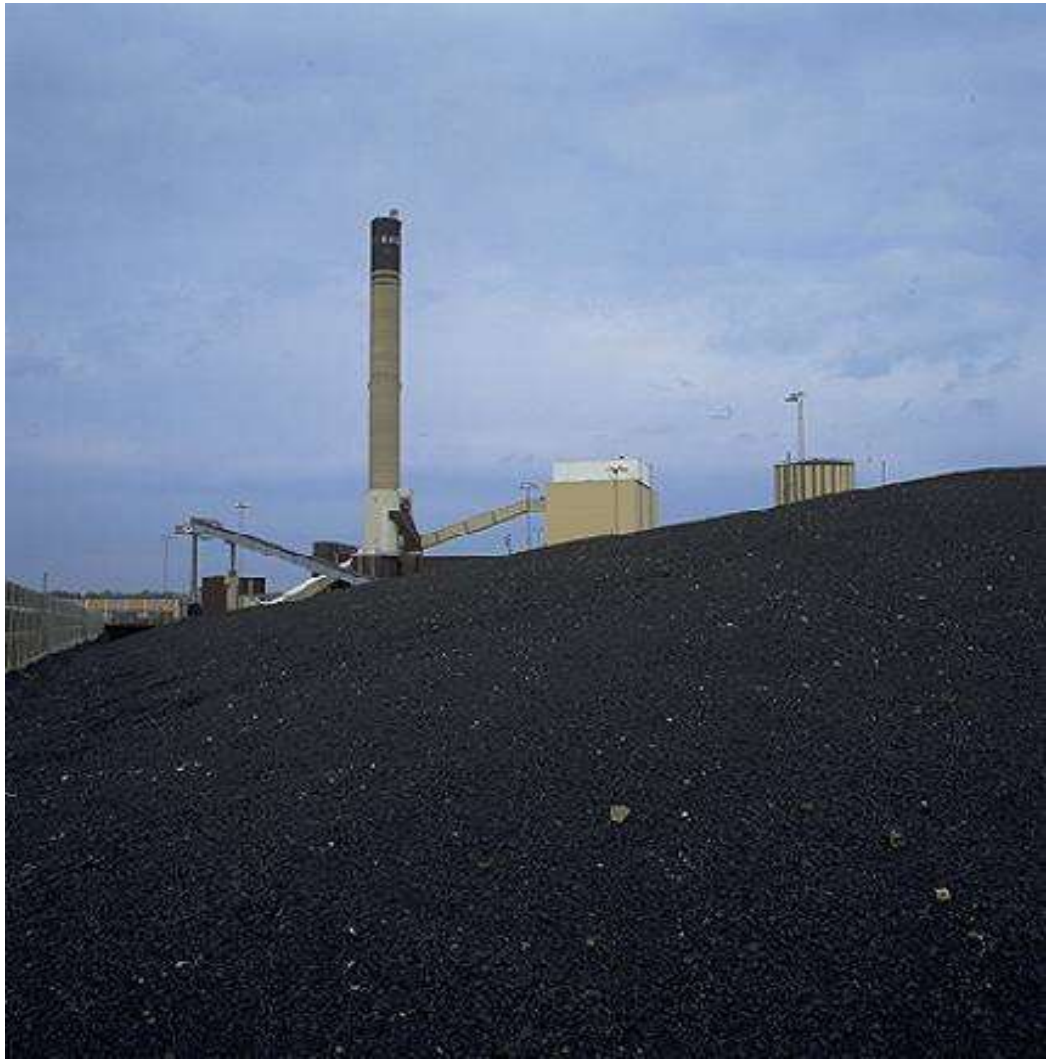
Impala Platinum Springs, South Africa, Precious Metal Smelter/ Refinery , SO2, SO3, NO, CL2, HCL, 2 paths.

Amplats Waterval, South Africa , Smelter off gases , acid plant , SO2, SO3, process and emission, 4 paths

Amplats ACP, South Africa , Smelter off gases , acid plant , SO2, SO3, process and emission, 2 paths

Fluorcid, Italy , Acid Plant, SO2, emission

POWER PLANTS



Some examples of Power Plant references world-wide

User	Type	No of systems	First Inst. Year
Kansas Power & Light , US	Power Plant	9 systems	1991
Stockholm Energi, Sweden	Waste/Power Plant	11 systems	1991
Public Service of Colorado, US	Power Plant	17 systems	1991
Salt River project, US	Power Plant	7 systems	1992
Electricity Supply Board , Ireland	Power Plant	16 systems	1995
Formosa Plastic Group,Taiwan	Petrochemical/Power	40 systems	1997
Tenaga Nasional,Malaysia	Power plant	14 systems	2004
China Light &Power ,Hong Kong	Power Plant	2 systems (8 paths)	2005
KEPCO Tea An, Korea	Power Plant	36 systems	2005

CEMENT PLANTS

Some HOLCIM Cement Plants using Opsis

Cementos APASCO, Mexico - SO2, NOx, CO, CO2, HCL, NH3, O2

Holdercim, Brasil - System 400 Ext. SO2, NOx, CO, Thermo - FID (THC), O2

Cementos Caribe, Venezuela San Sebastian-SO2, NOx, CO, CO2, HCL, HF, HBR, O2, DURAG M300

Cementos Caribe Puerto Cumarebo- SO2, NOx, CO, CO2, HCL, HF, HBR, O2, DURAG M300

Cementos Boyaca, Colombia-SO2, NOx, CO, CO2, HCL, HF, HBR, O2, DURAG M300

HCB, Eclépens; Switzerland (see report RAP-76) NOx, NH3, CO, CO2, HCL, HF, HBR,H2O, HG, BENZENE

HCB, Untervaz, Switzerland NOx, CO, CO2, HCL, HF, HBR,H2O, BENZENE

Cement Origny, Rocheford, France , 1 system NO, NO2, SO2, HCl, CO, CO2, CH4, THC.

Cement Origny, Altkirch, France, 1 system NO, NO2, SO2, HCl, CO, CO2, CH4, THC.

Cement Origny, Lumbre, France , 2 systems NO, NO2, SO2, HCl, CO, CO2, CH4, THC.

Milburn Cement, New Zeeland, NO,NO2, SO2

Merone , Italy, NO, NO2, SO2, HCl, NH3, CH4, THC.

Alpha Cement, South Africa , NO,NO2,SO2, CO,H2O, BENZENE, TOLUENE, DURAG and more……

TYPICAL USERS

HOLCIM was the first Cement company to issue a global environmental monitoring requirement for all corporate plants in the world.

All plants worldwide plants are reporting emission monitoring results to HOLCIM Technical Center , where data is investigated and used as quality control of the plants performance and operation

OPSIS is since long time the preferred supplier of CEM systems for the HOLCIM group. All HOLCIM plants must install CEM systems, and the brands accepted are OPSIS, ABB and SICK.

All of the mother companies plants in Switzerland are equipped with Opsis systems.

LAFARGE, today the largest cement group in the world.Several CEMS from Opsis installed in 2004-2006.

Other Opsis Users are Blue Circle, Heidelberg Cement,Siam Cement, and many more

TYPICAL GAS COMPOUNDS, HOLCIM

Cementos APASCO, Mexico - SO2, NOx, CO, CO2, HCL, NH3, O2

Holdercim, Brasil - System 400 Ext. SO2, NOx, CO, VOC, O2

Cementos Caribe, Venezuela San Sebastian-SO2, NOx, CO, CO2, HCL, HF, HBR, O2, DURAG M300

Cementos Caribe Puerto Cumarebo- SO2, NOx, CO, CO2, HCL, HF, HBR, O2, DURAG M300

Cementos Boyaca, Colombia-SO2, NOx, CO, CO2, HCL, HF, HBR, O2, DURAG M300

HCB, Eclépens; Switzerland ,NOx, NH3, CO, CO2, HCL, HF, HBR,H2O, HG, BENZENE

HCB, Untervaz, Switzerland NOx, CO, CO2, HCL, HF, HBR,H2O, BENZENE

Cement Origny, Rocheford, France , NO, NO2, SO2, HCl, CO, CO2, CH4, VOC.

Cement Origny, Altkirch, France, NO, NO2, SO2, HCl, CO, CO2, CH4, VOC.

Cement Origny, Lumbre, France , NO, NO2, SO2, HCl, CO, CO2, CH4, VOC.

Merone , Italy, NO, NO2, SO2, HCl, NH3, CH4, VOC.

Alpha Cement, South Africa , NO,NO2,SO2, CO,H2O, BENZENE, TOLUENE

Siam City Cement, Thailand , NO,NO2,SO2,CO,CO2,H2O,HF,HCL,VOC

Emitter /Receiver after final absorption stage

So,

what is

your Choice

INSITU PROBE TYPE

or

INSITU CROSS STACK TYPE ???

TECHNOLOGIES FOR Ambient Air Quality Monitoring (AQMS)

Continuous Ambient Air Quality Monitoring

Methods

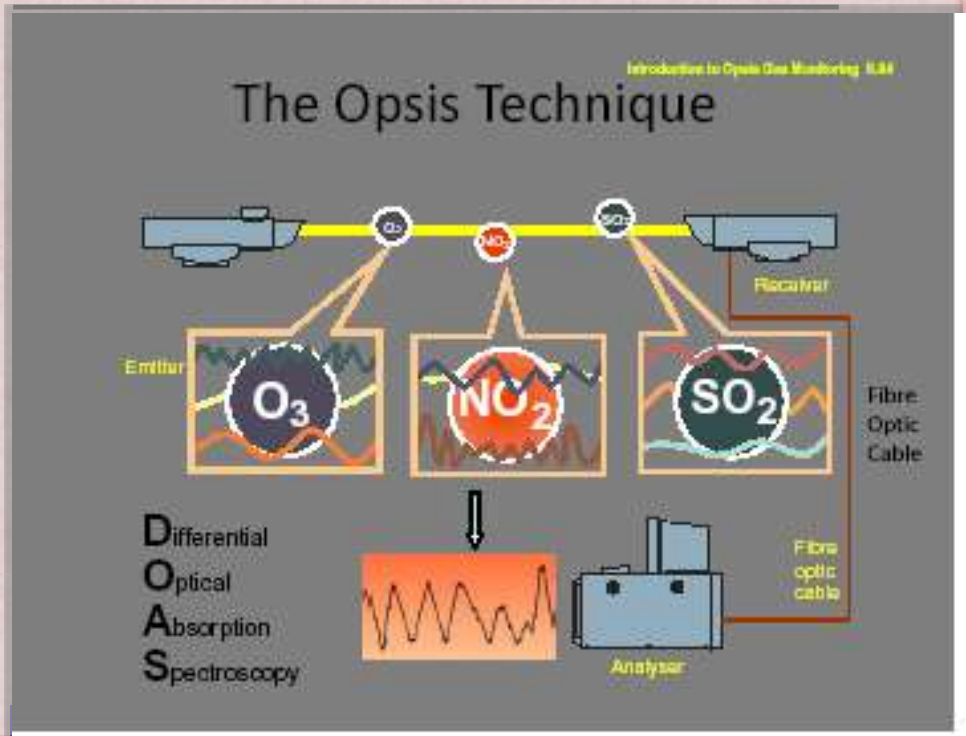
- Open Path
- Extractive

Techniques

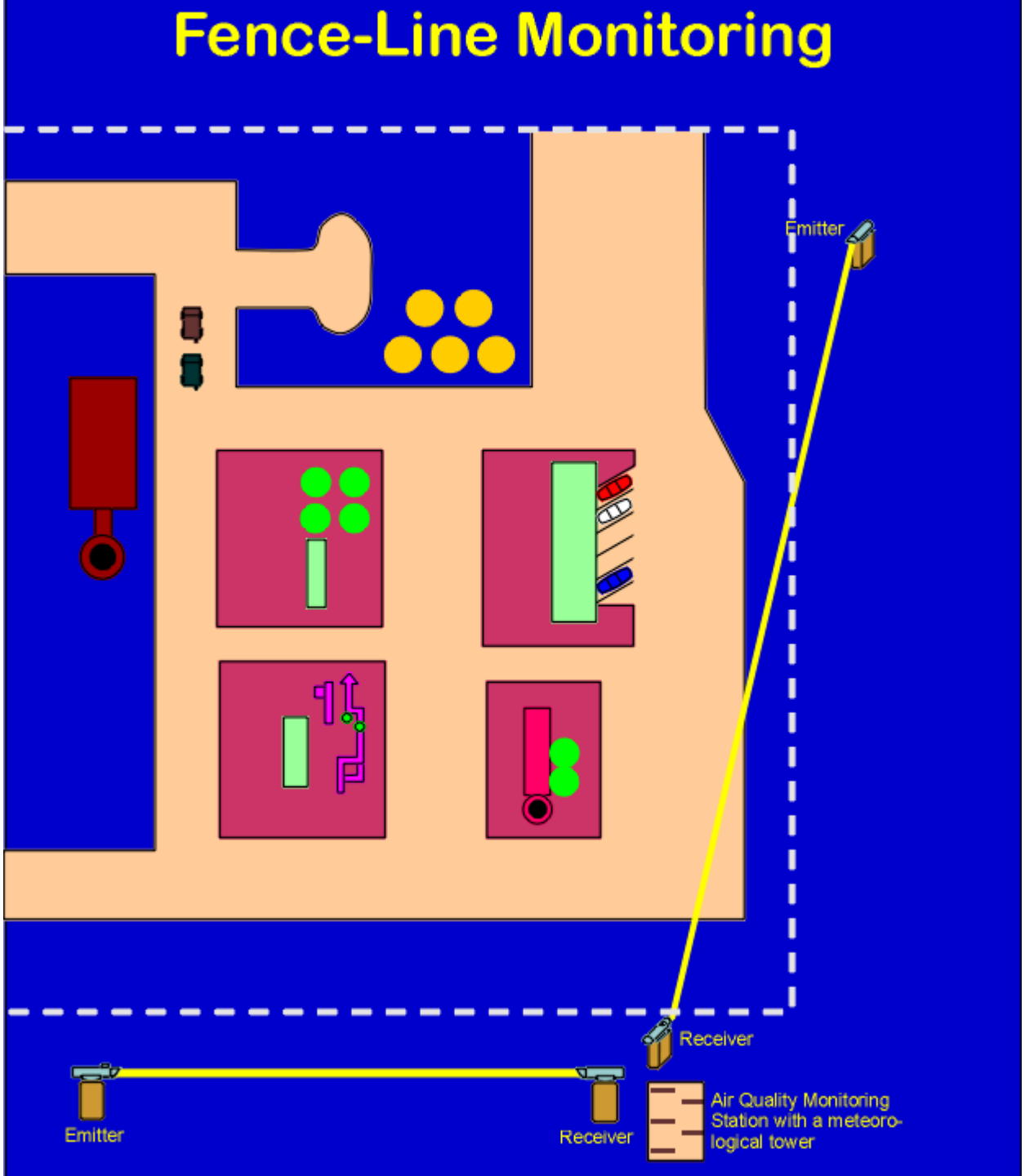
- DOAS
- FTIR
- IR absorption
- UV absorption
- Chemiluminescense
- UV-fluorescense

- **POINT MONITORING**

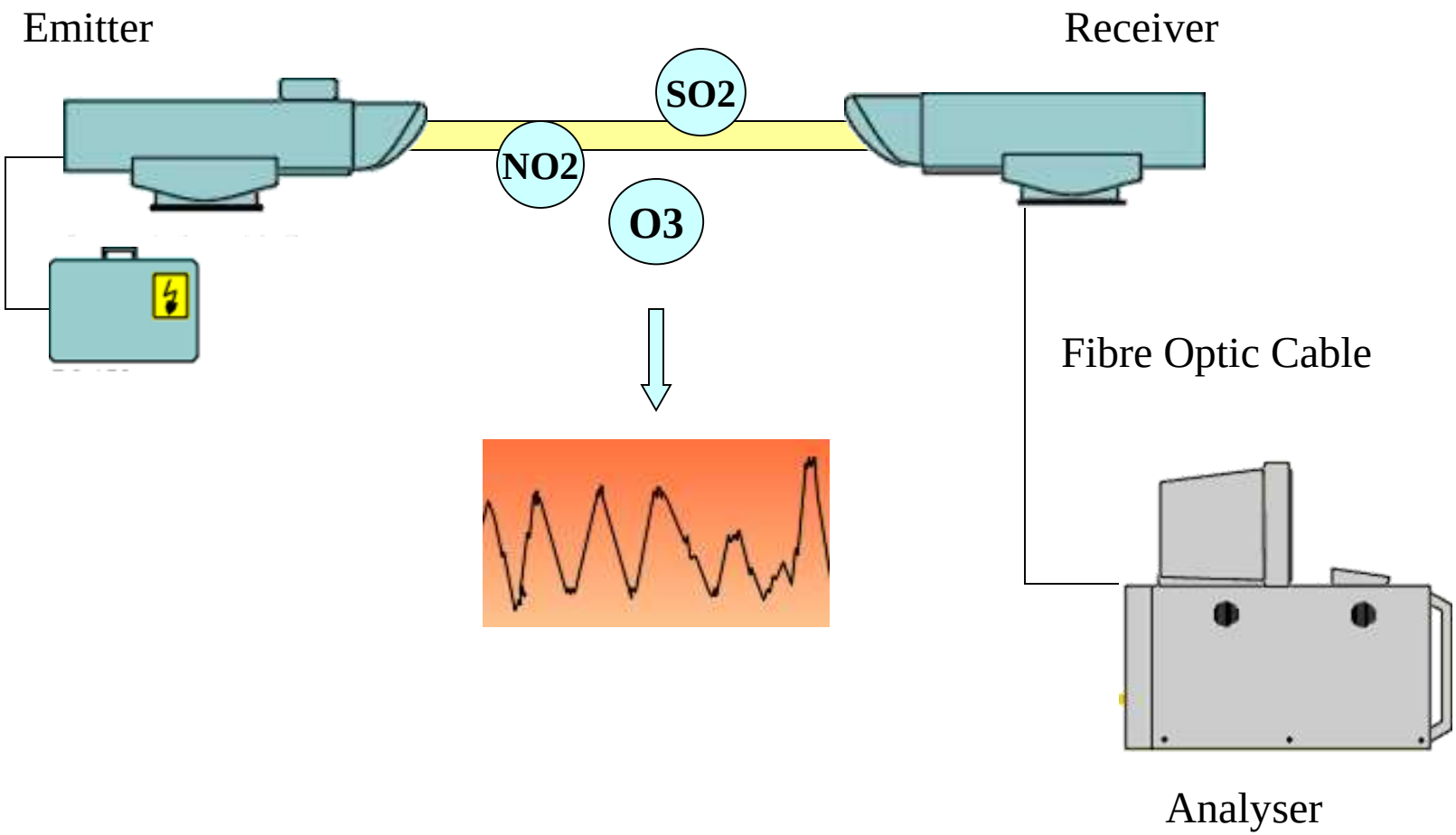
OPEN PATH MONITORING



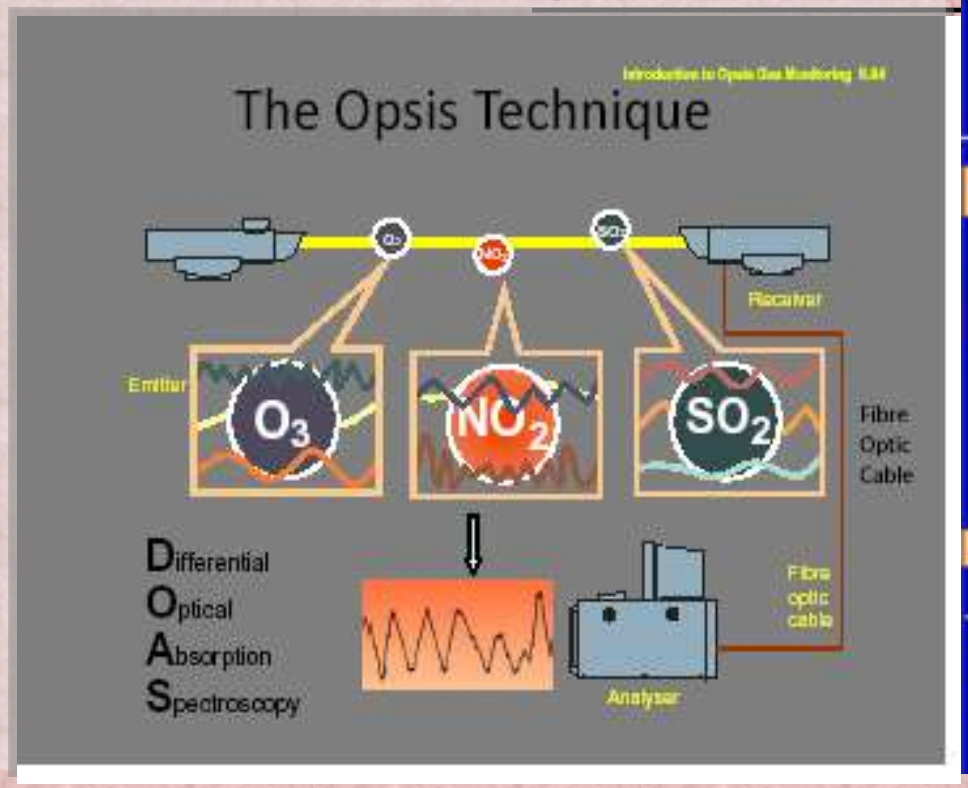
Fence-Line Monitoring



OPSIS TECHNIQUE



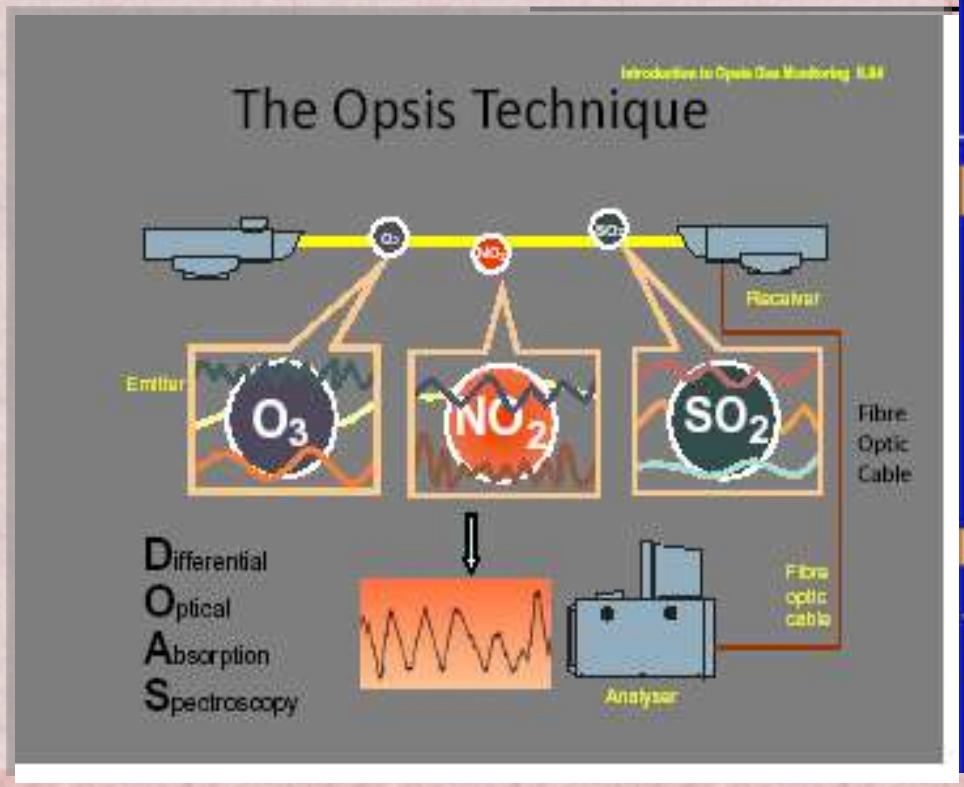
OPEN PATH MONITORING



1.Non sampling System means No Moving parts

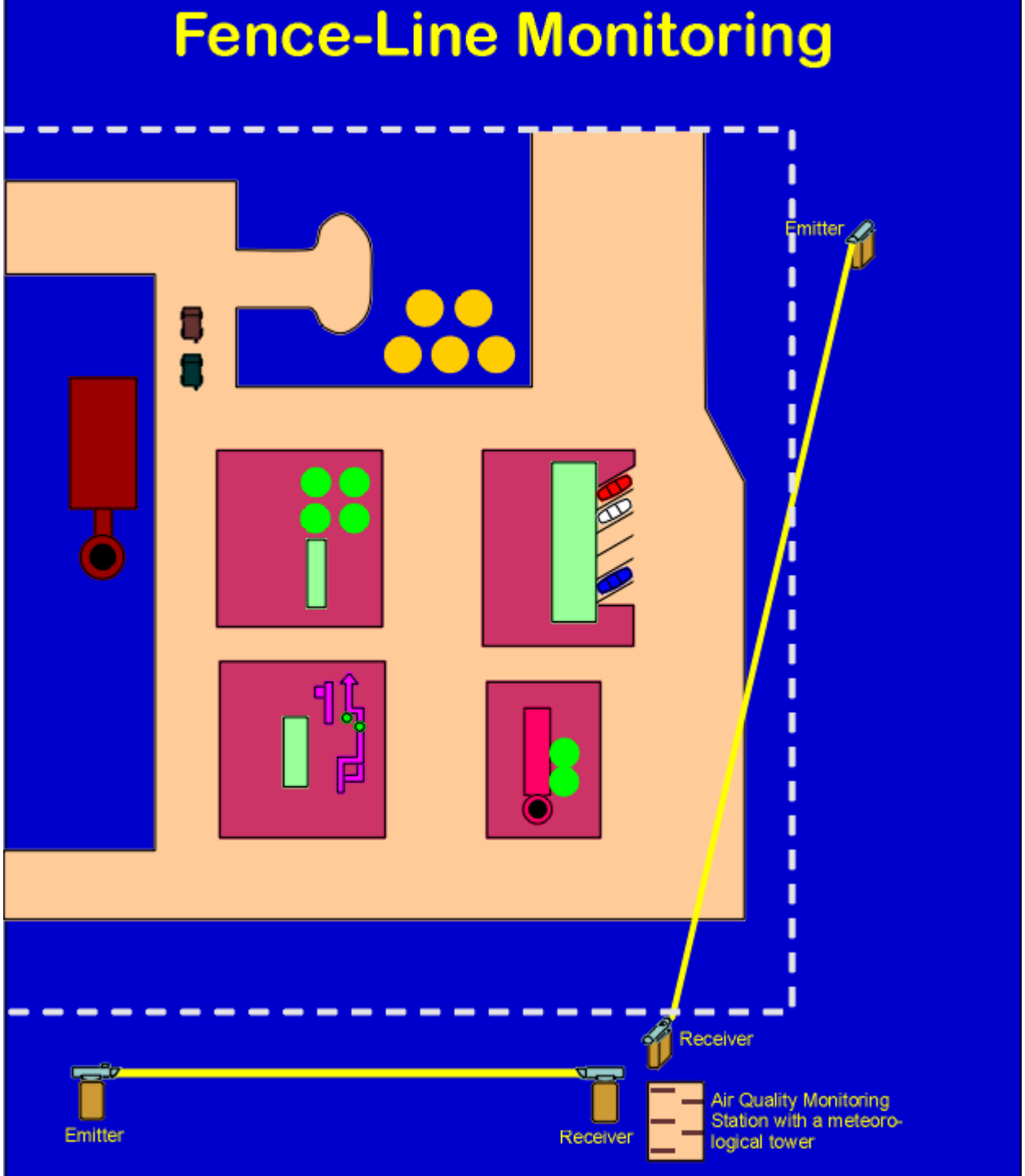
Hence maintenance Zero/Min.

OPEN PATH MONITORING

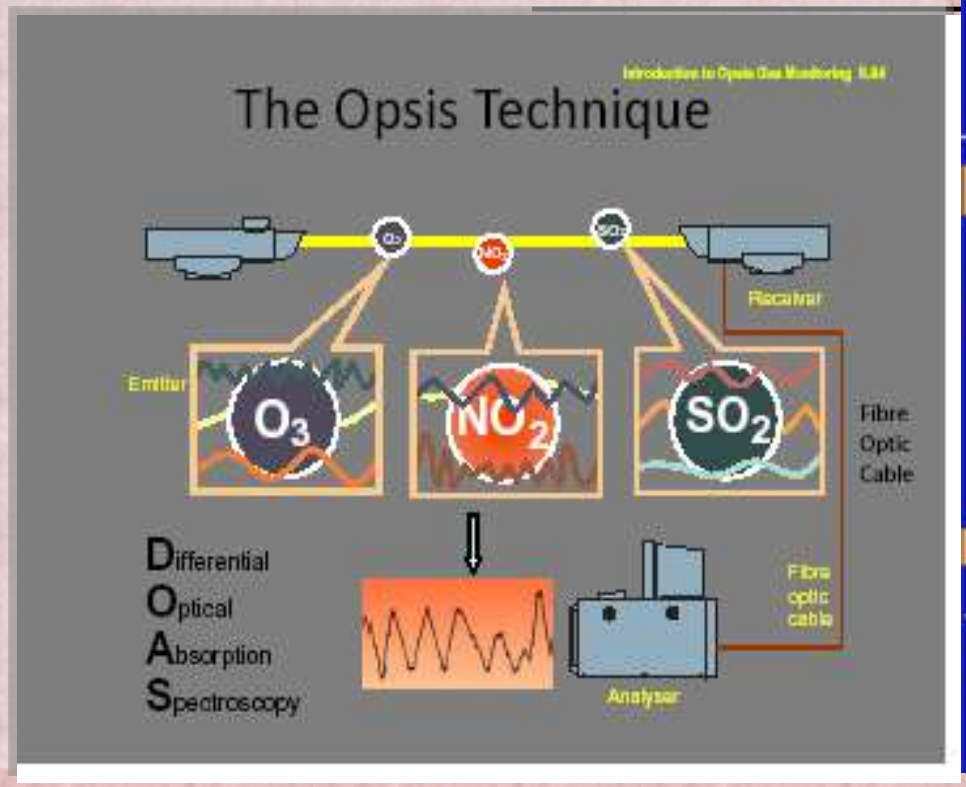


2. Area Coverage : 500--2000 mtrs (min 15mtr US EPA)

Fence-Line Monitoring

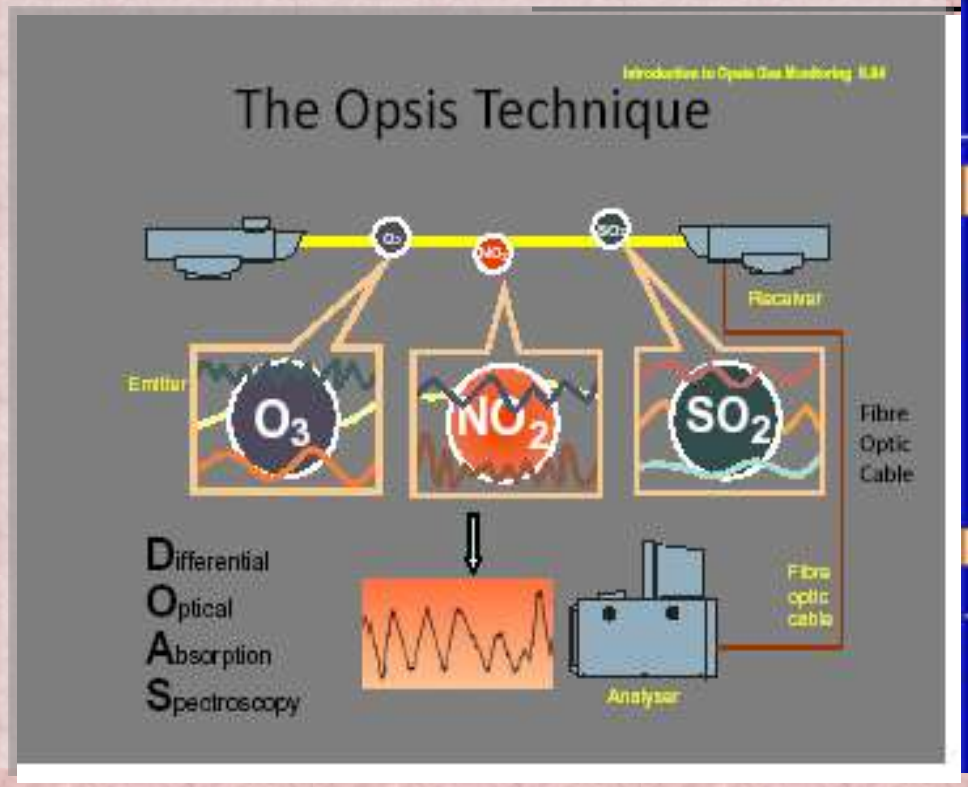


OPEN PATH MONITORING



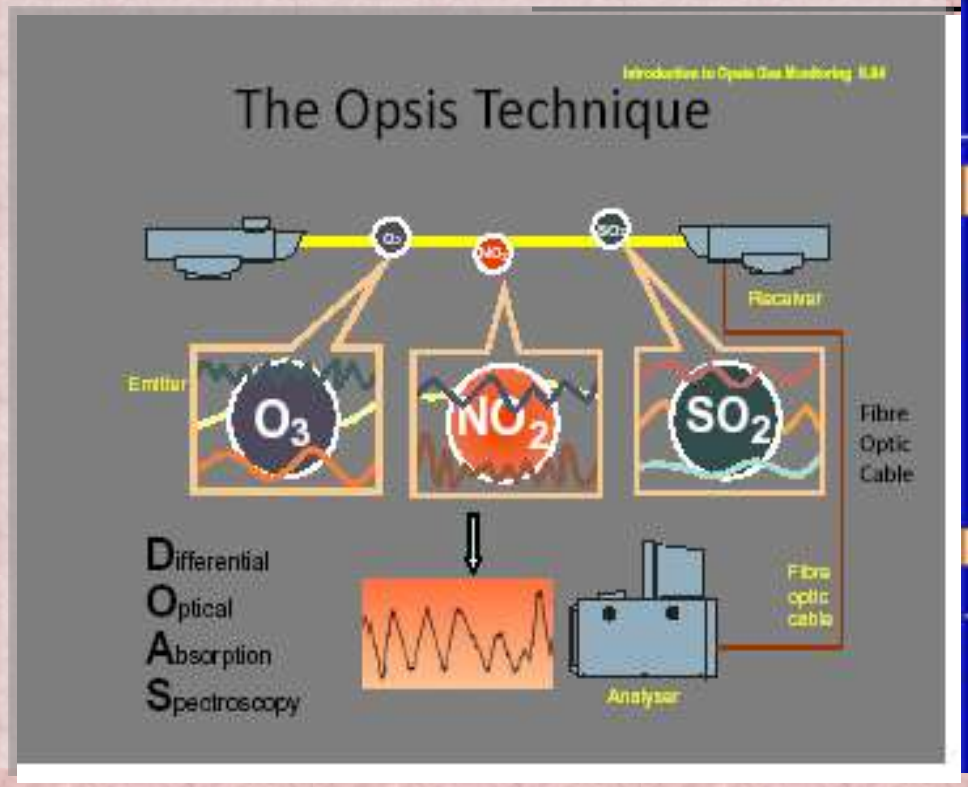
3. High Data Capture Rate of 95-98% justifies meaning of Continuous Monitoring

OPEN PATH MONITORING

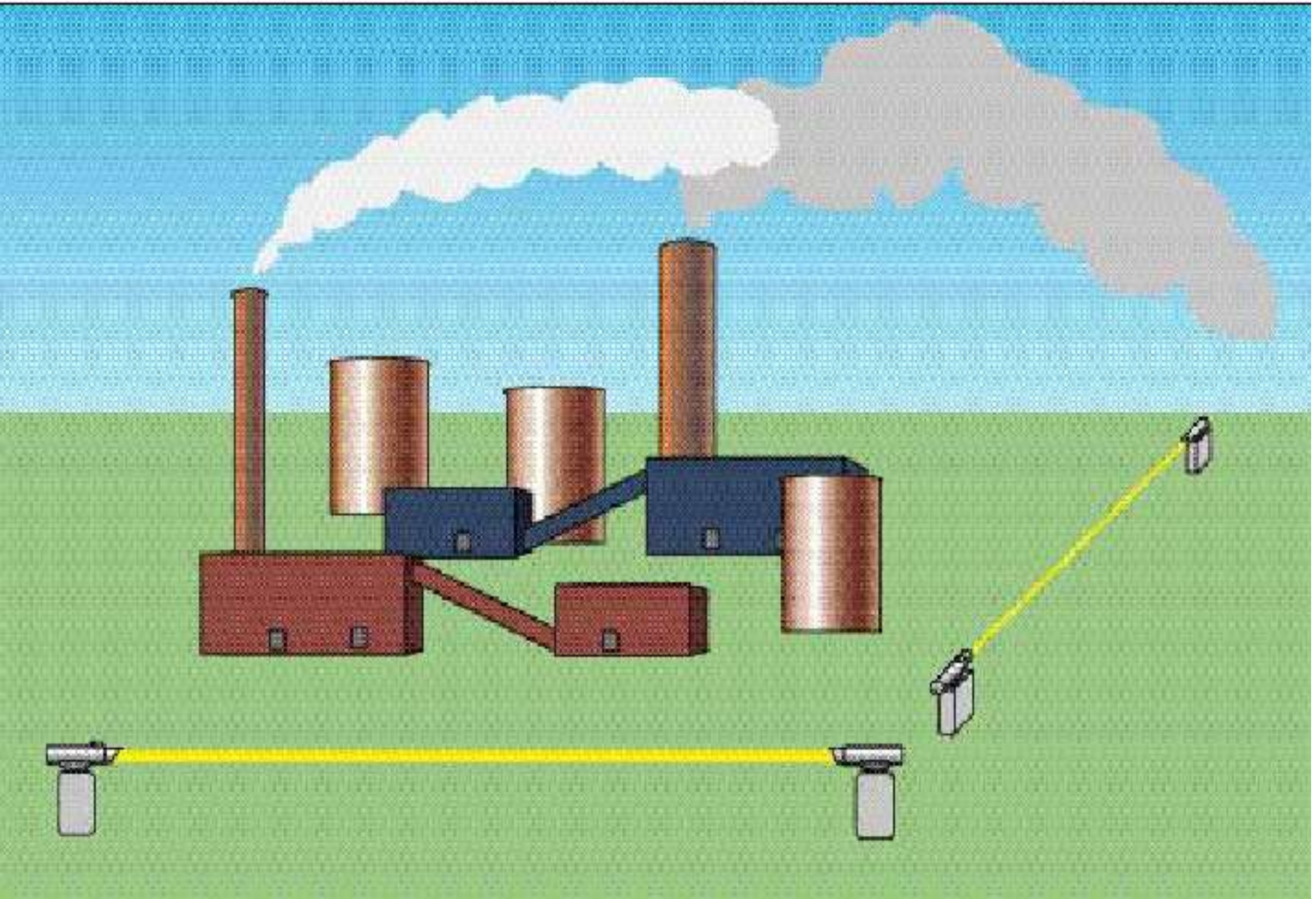


4. Single Analyser for Multi gases :
More than 30 compounds measured with a single Analyser

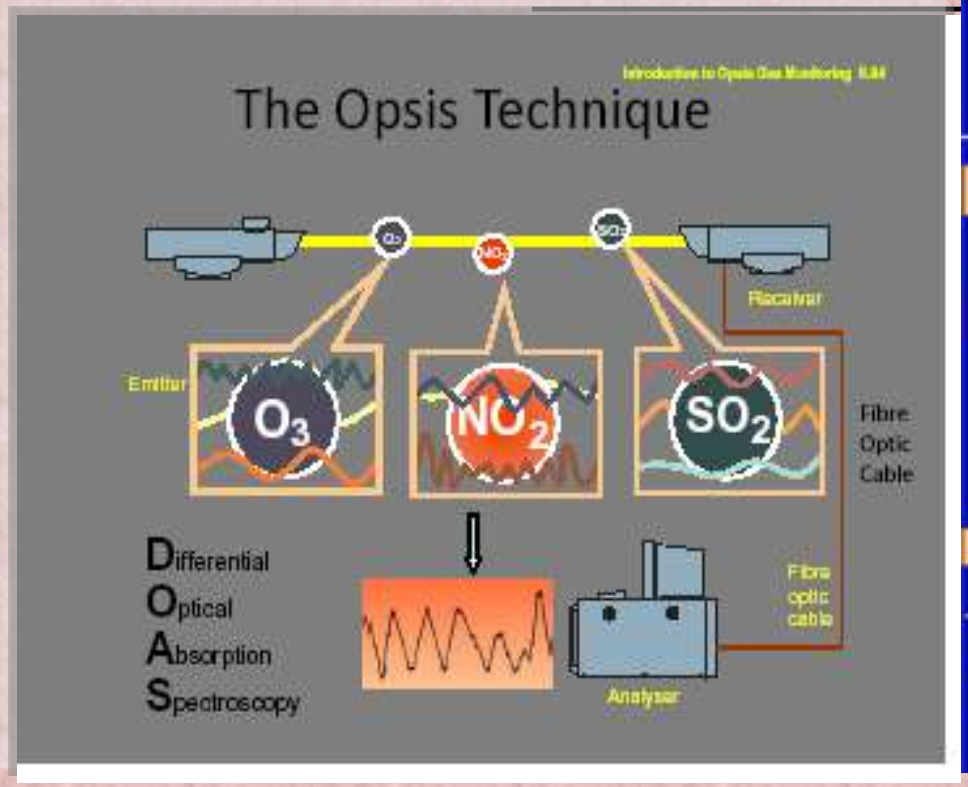
OPEN PATH MONITORING



5. Fence Line Monitoring possible only With the open path Technology

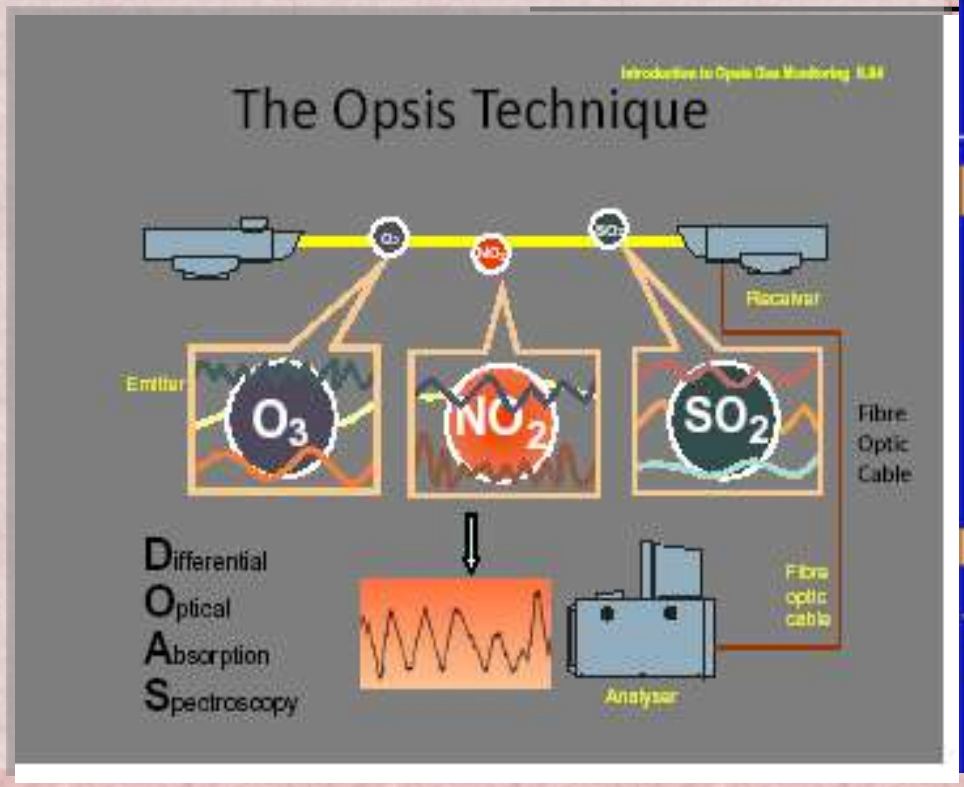


OPEN PATH MONITORING



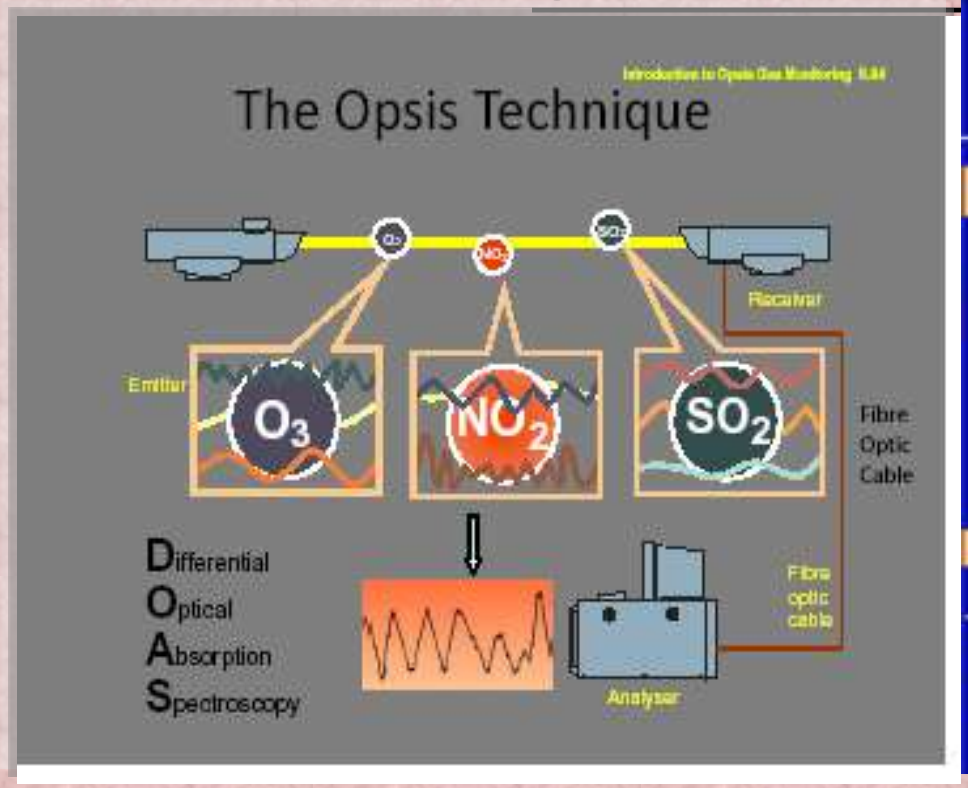
6.Representability of Sample : Big Area

OPEN PATH MONITORING



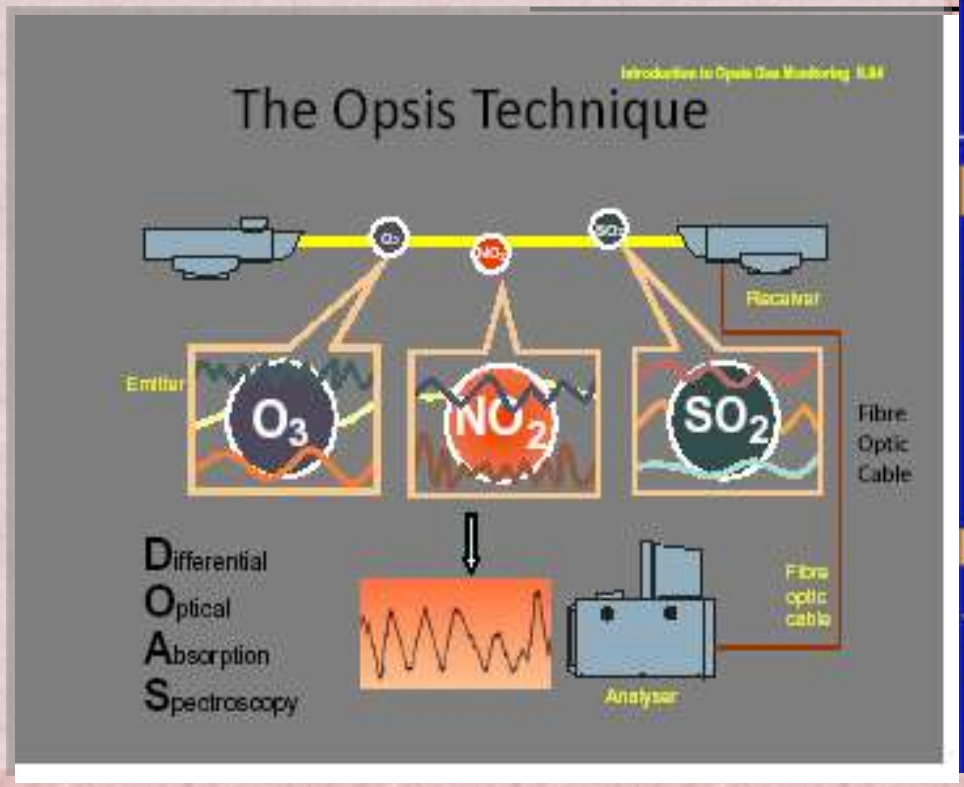
7.No moving Parts hence very less Maintenance.

OPEN PATH MONITORING



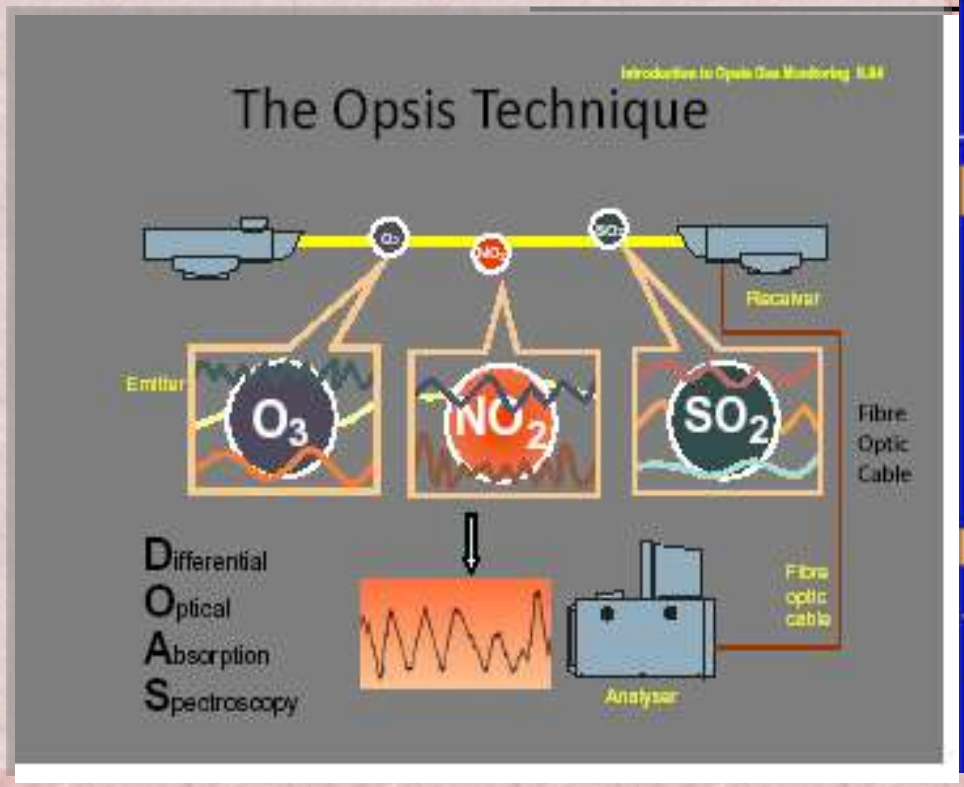
8. Yearly once Calibration required as the span drift is only +/_ 4% per year

OPEN PATH MONITORING



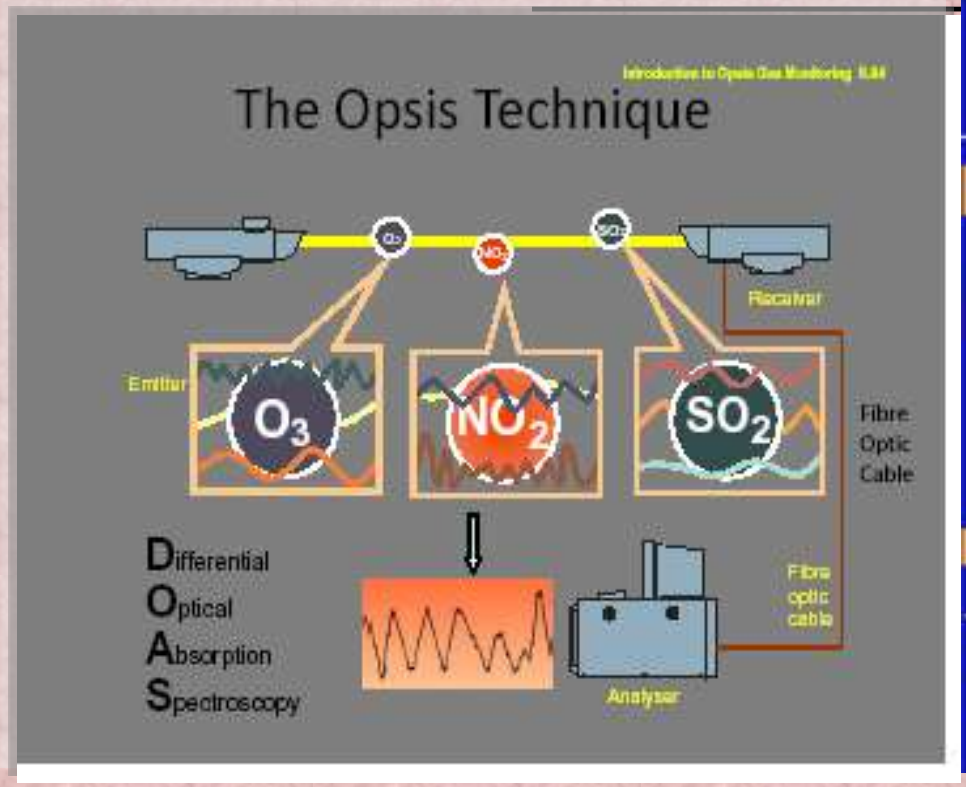
9. Multiplexing facility for Monitoring with 6 paths

OPEN PATH MONITORING



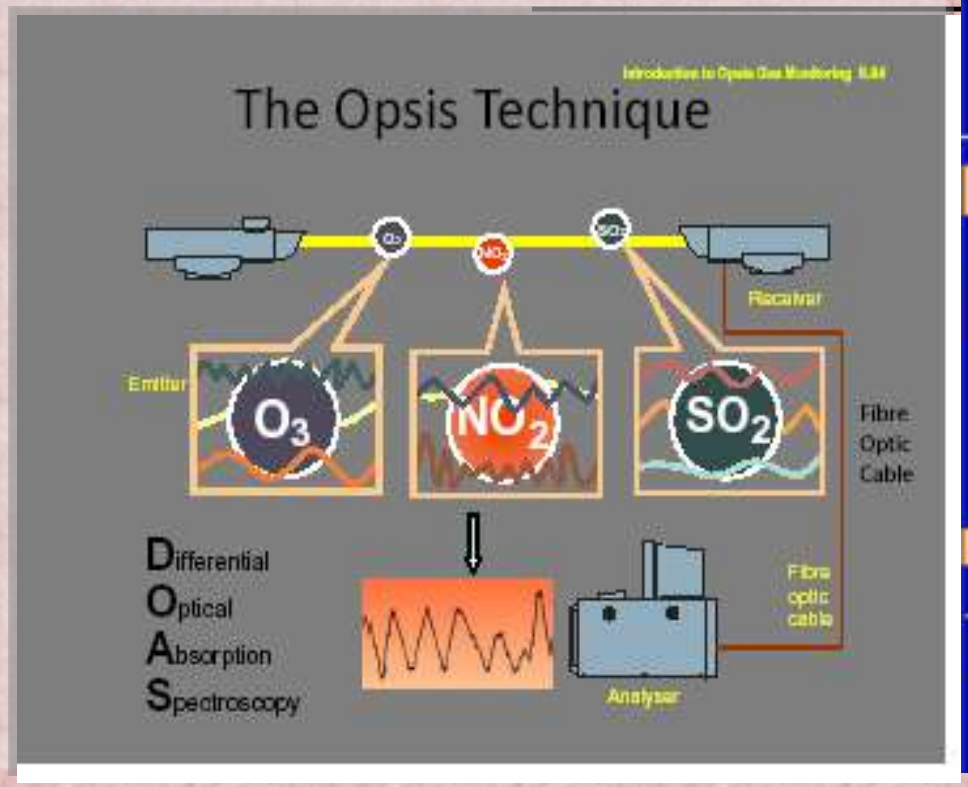
10. Cost Of Ownership in 5 Years : Cheaper when compared to Extractive Analysers

OPEN PATH MONITORING



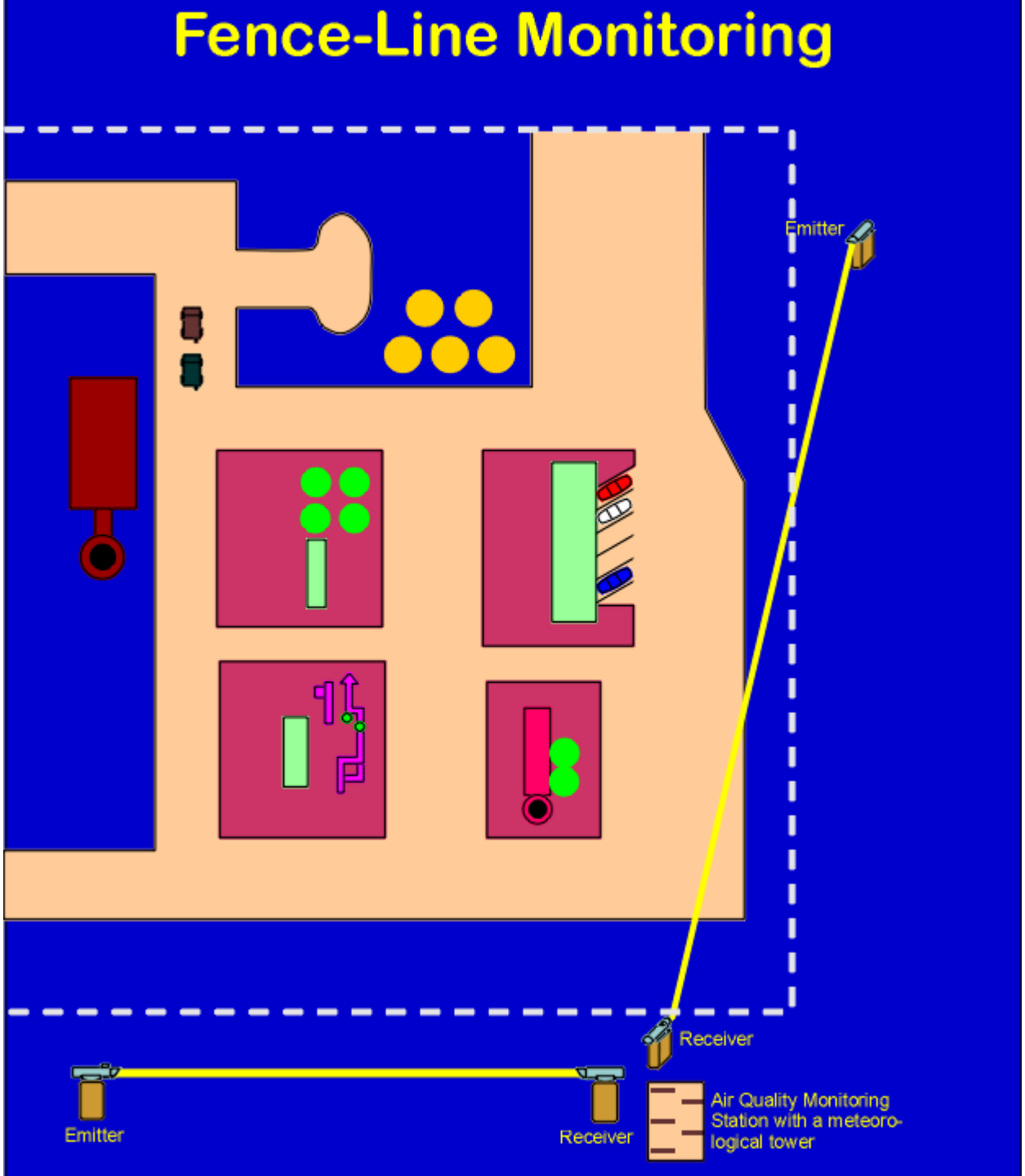
11.Monitoring of many Criteria Gases and Smelling Compounds. BTX

OPEN PATH MONITORING



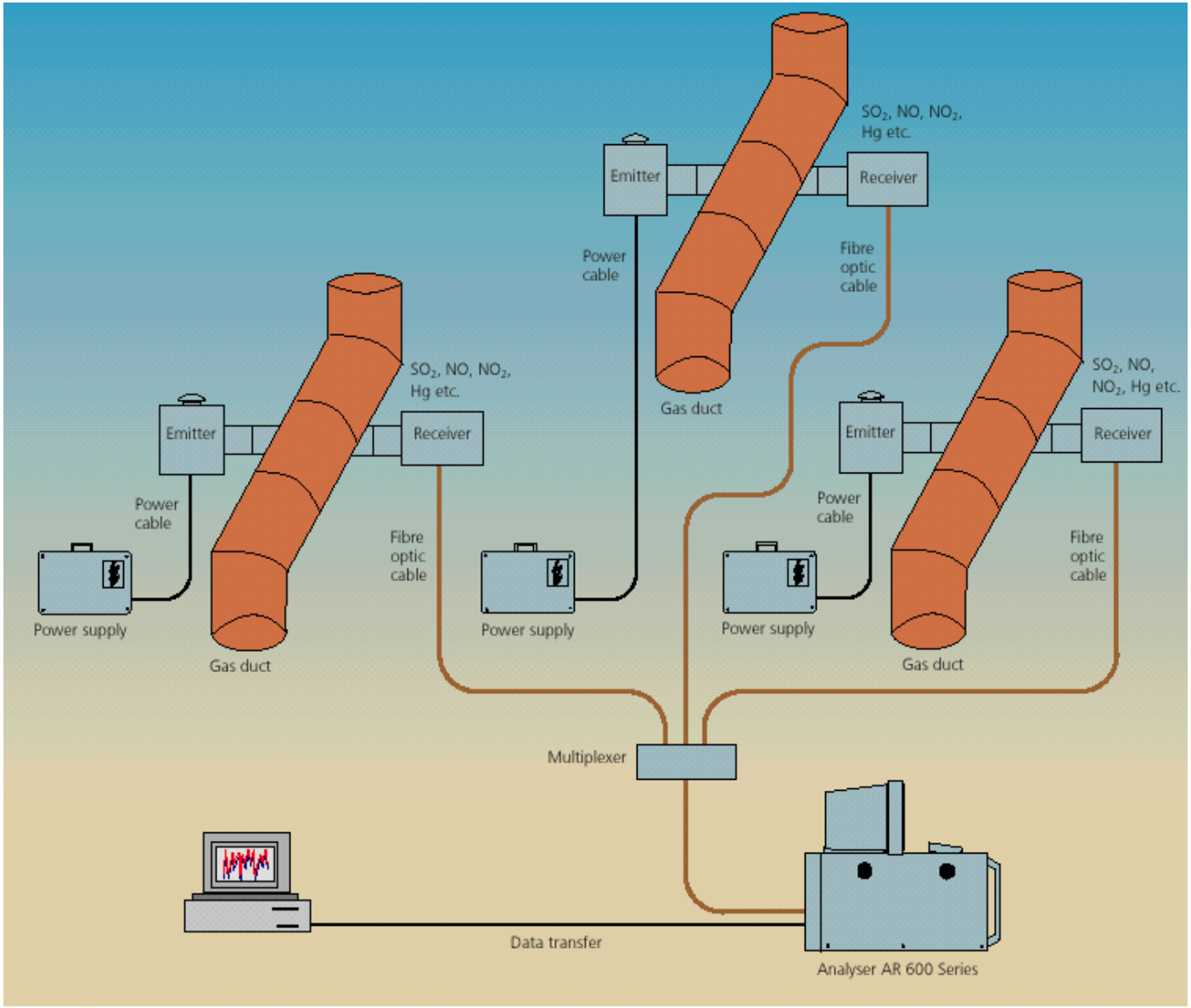
12. Ability to Measure both Ambient & Stack with Same Analyser

Fence-Line Monitoring

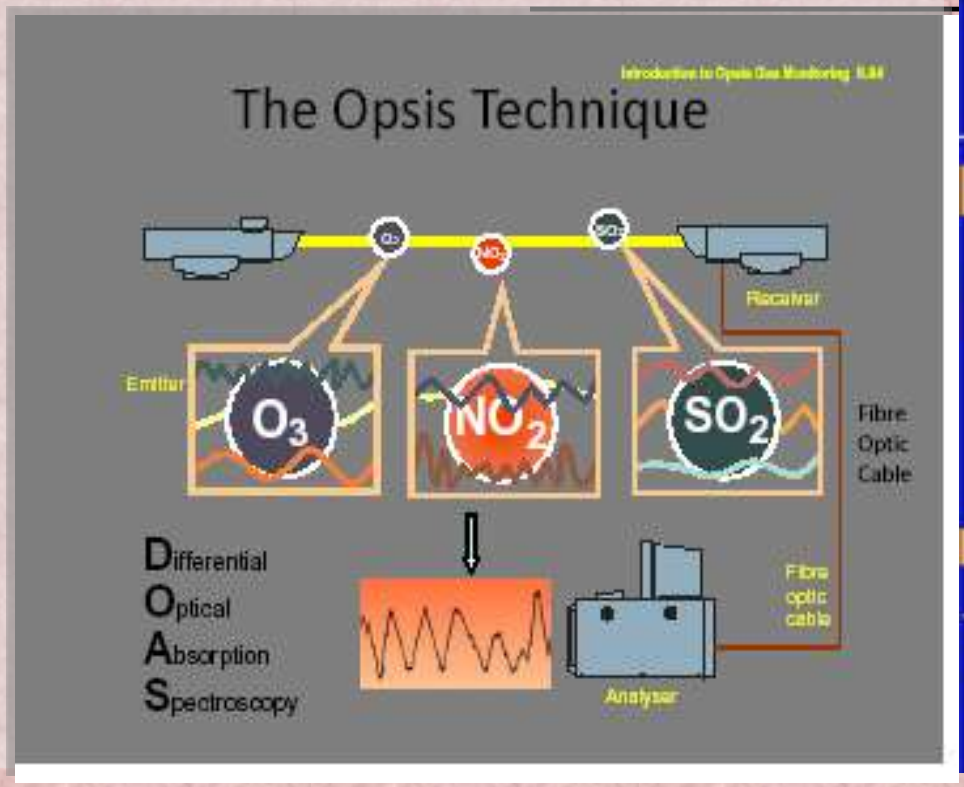


Multi-path Applications

One analyser monitors 6 points

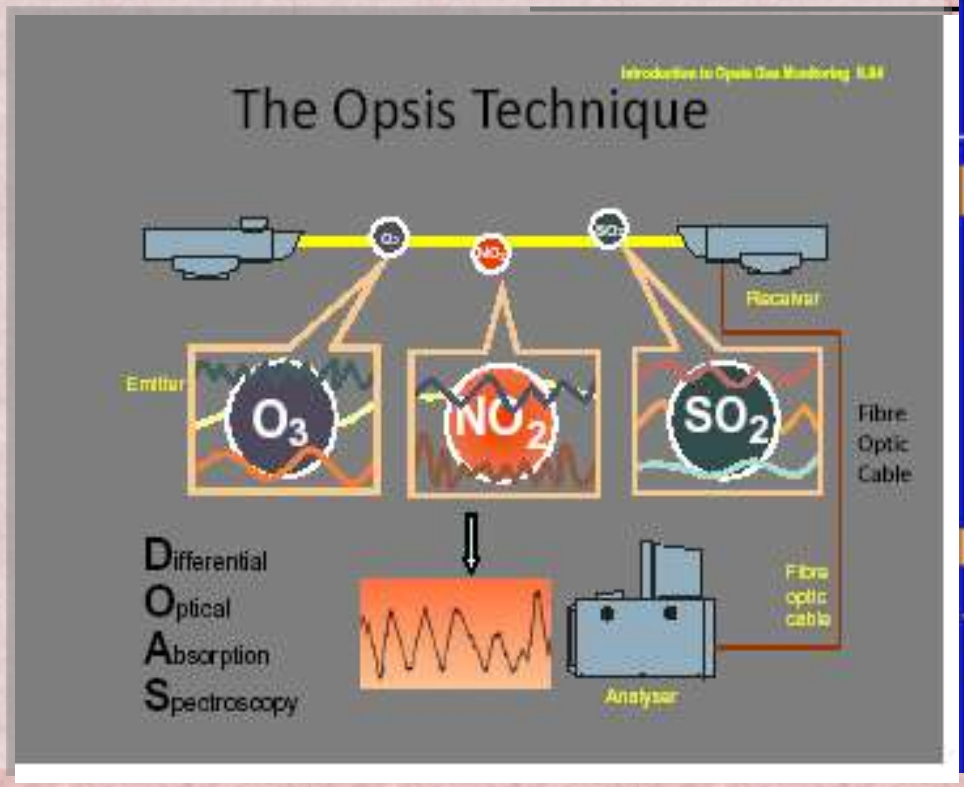


OPEN PATH MONITORING



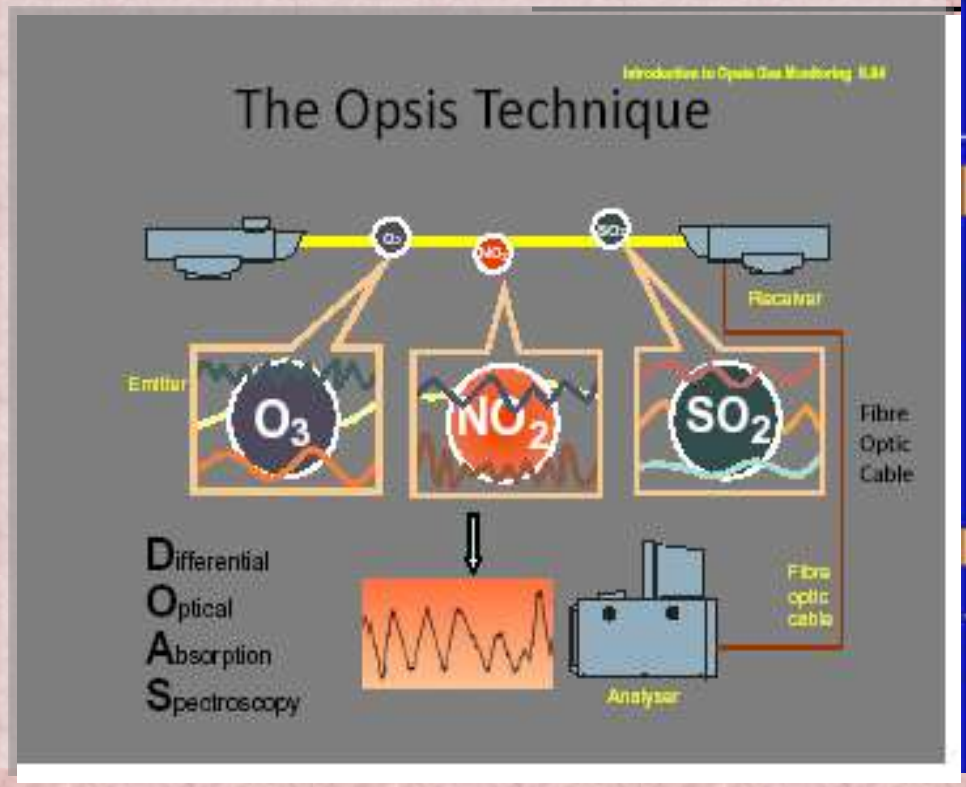
13. Future Up gradation Possible for more gases / more paths

OPEN PATH MONITORING



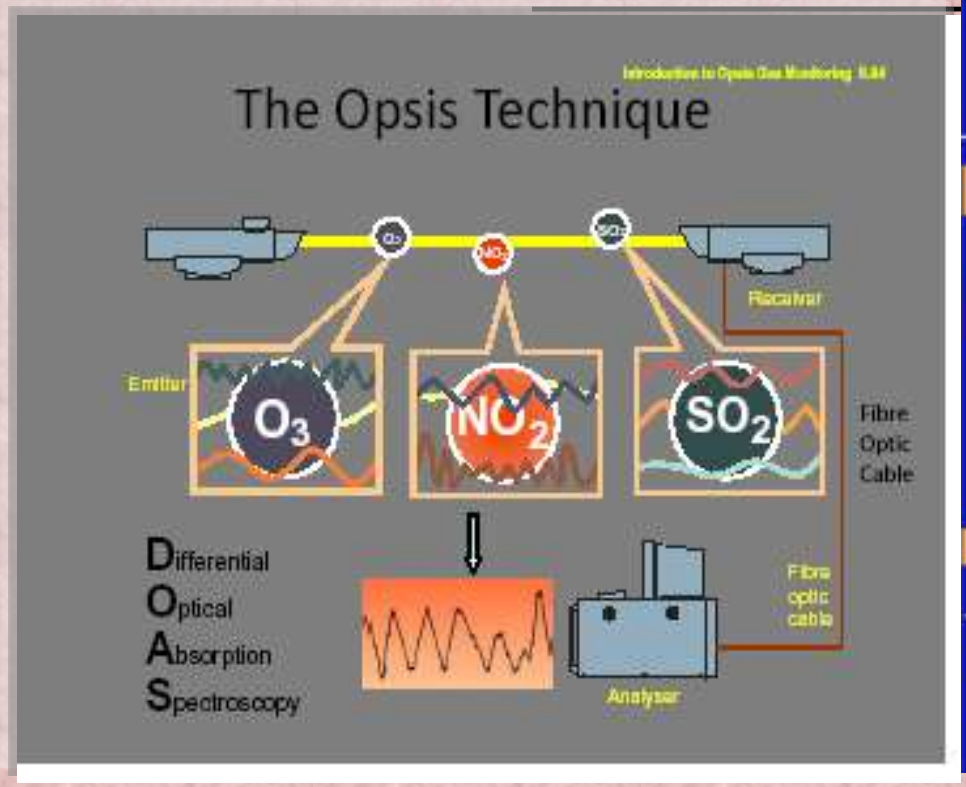
14.Linearity : Better than Extractive Analysers

OPEN PATH MONITORING



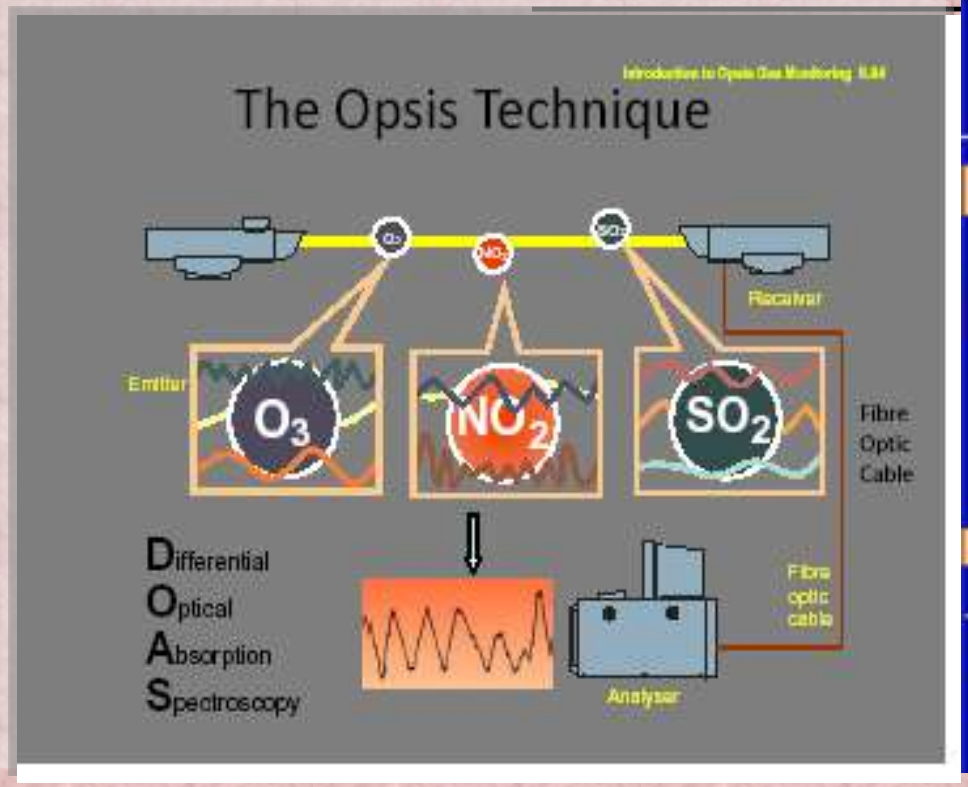
15. US EPA
TUV APPROVED (19 AGENCIES ACORSS WORLD)

OPEN PATH MONITORING



16. ANALYSER HAS GOT BUILT IN LOGGER.

OPEN PATH MONITORING



17. POWER CONSUMPTION :
1/3 RD OF AN EXTRACTIVE SYSTEM

CENTRAL POLLUTION CONTROL BOARD

Ministry of Environment & Forests, Govt. of India

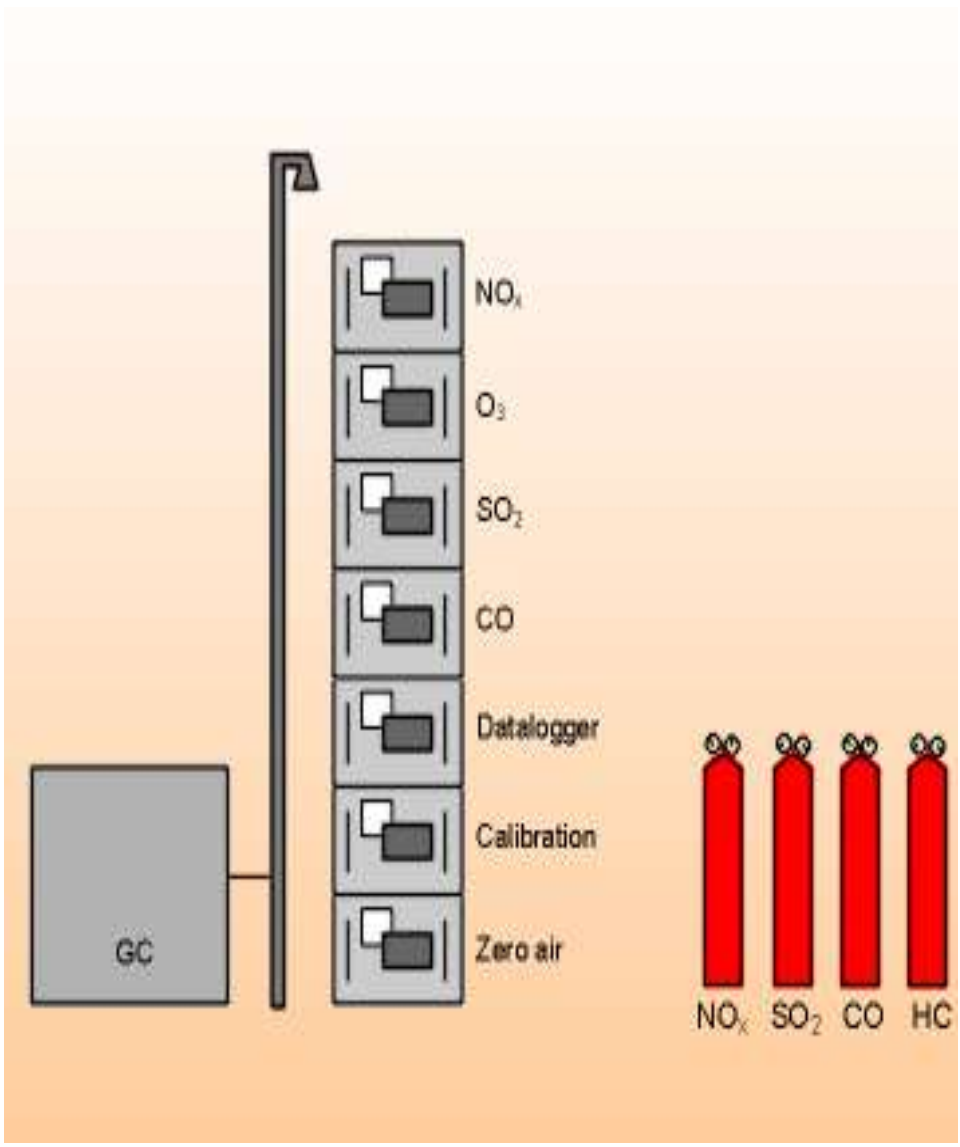
"Parivesh Bhawan", East Arjun Nagar, Delhi-32, INDIA

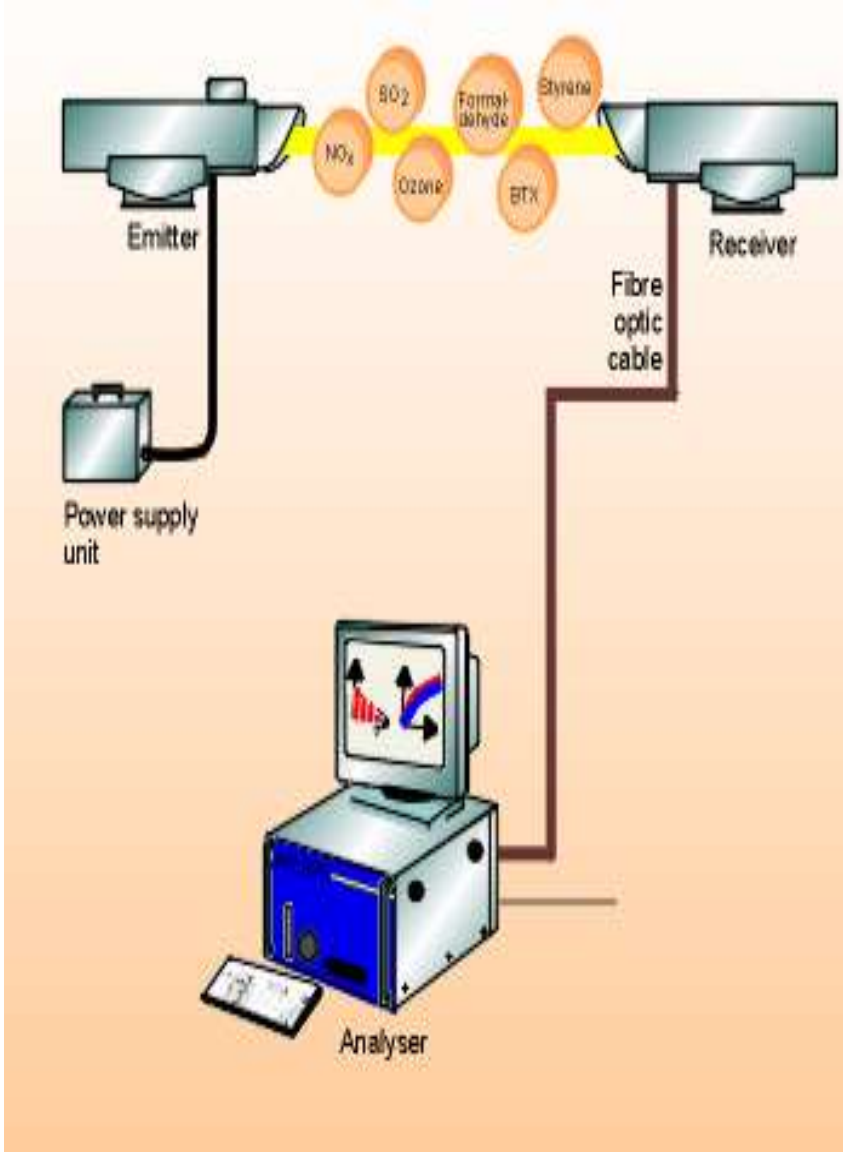
Request for Expression of Interest

Real Time / Continuous Ambient Air Quality Monitoring System

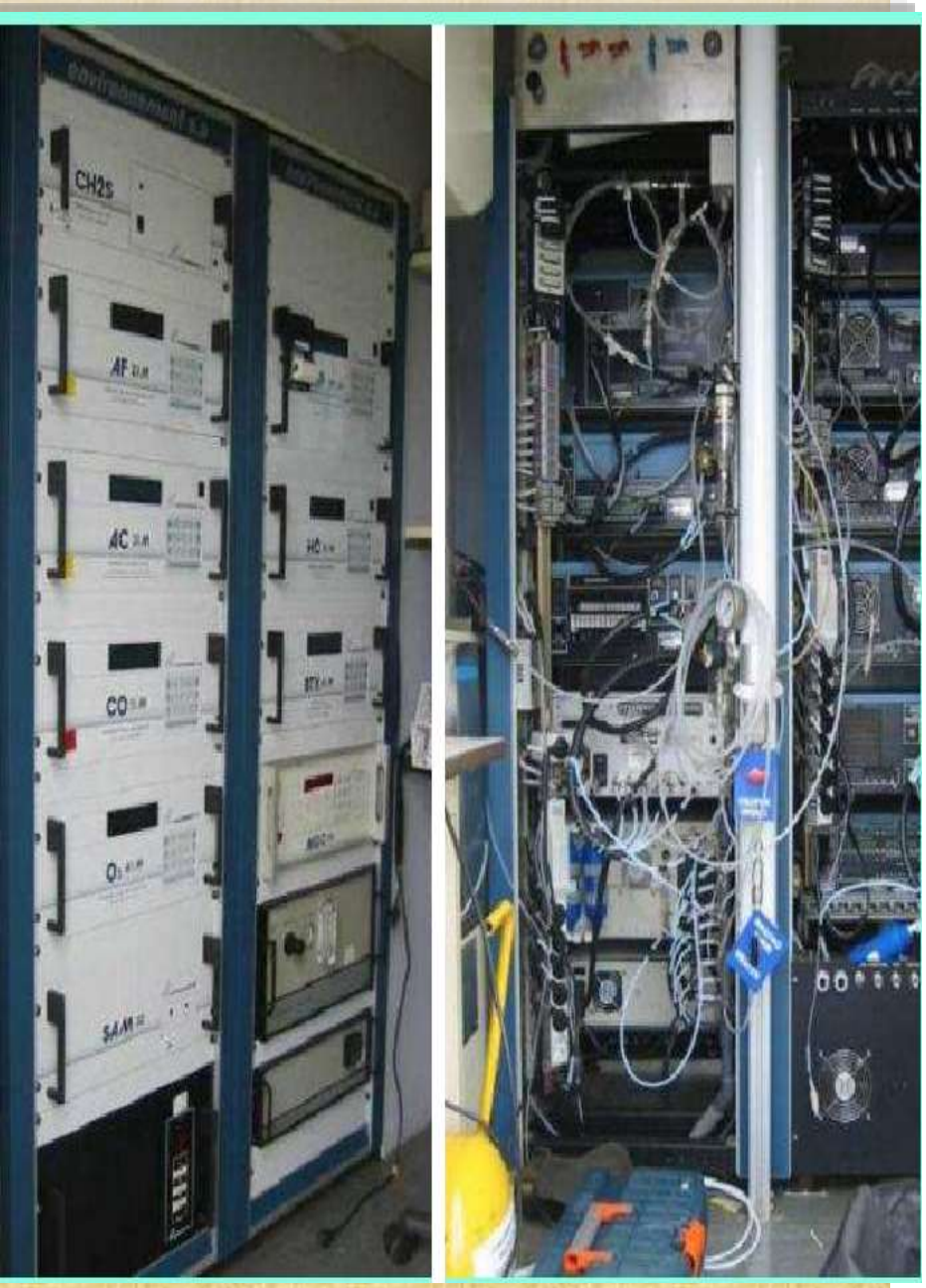
1. The Central Pollution Control Board (CPCB) is planning to procure complete Real Time / Continuous Ambient Air Quality Monitoring System for 8 parameters (Viz SO_2, NO_2, NH_3, O_3, CO, Benzene, $PM_{2.5}$ and PM_{10}) notified under the National Ambient Air Quality Standards (NAAQS). The Analysers / System shall conform to the standards like FRM (USEPA), FEM (USEPA), TUV (EN) or equivalent. Expression of Interest invited from eligible manufacturers / suppliers to participate in Techno-Commercial bidding for the following systems:
   (I) Easily transportable system for indicative monitoring/episodal pollution monitoring / short term monitoring / point ambient monitoring.
   (ii) Conventional system for long term monitoring / trend analysis.
2. Interested manufacturers/suppliers shall submit necessary documents in support, which include brochures, client details, list of Indian users, spare, service & support back up etc. The suppliers shall ensure for availability of Spare parts for at least next seven years.
3. Expression of interest must be delivered to the address below:
   The Member Secretary, Central Pollution Control Board, Parivesh Bhawan, East Arjun Nagar, Delhi-110032, India.
4. Last date of submission: 30 days from the date of publication.

CONVENTIONAL VERSUS OPEN PATH





- **POINT MONITORING**



OPEN PATH MONITORING

OPSIS

SO2

NO2

OZONE

Ammonia

Benzene

CO

Hg

PM10

PM2.5

Lead

Benzopyrene

Arsenic

Nickel

AMBIENT SPM / RSPM ANALYSER

European Reference Method (EN12431)

TSP/PM10/PM2.5/PM1.0

Worlds only combined Beta monitor and 47 mm diam. filter sampler

Temperature controlled inlet (TS200)

Direct calibration of the monitor using gravimetric weighing of sampled filters

Allows full lab analysis of filters

Up to 80 days unattended operation

Remote control via RS232/modem

US EPA Equivalent method

Complete Automatic weather stations

Complete range of Data logger

Wide range of sensors

All the accessories for a complete installation

Many communication media options

Range of PC program availability

Complete range of sensor with analogue output to measure all the meteorological parameters

Performance Data (typical data which may vary depending on application)

Compound	Max. measurement range[3] (500 m path)[4]	Min. detectable quantities (monitoring path 500 m, measure-ment time 1 min.)	Zero drift (500 m path, max. per month)	Span drift (per month, better than)	Span drift (per year, better than)	Linearity error (of measure-ment range, better than)	Max. length of fibre optic cable (when measuring several com-pounds)[1]	Hardware requirement
AR500/AR520 Analyser								
NO_2	0-2000 µg/m³	1 µg/m³	±2 µg/m³	±2%	±4%	±1%	10 m	AR500/520
SO_2	0-5000 µg/m³	1 µg/m³	±2 µg/m³	±2%	±4%	±1%	10 m	AR500/520
O_3	0-1000 µg/m³	2 µg/m³	±4 µg/m³	±2%	±4%	±1%	10 m	AR500/520
NO[2]	0-2000 µg/m³	2 µg/m³	±4 µg/m³	±2%	±4%	±1%	10 m	AR500/520
NH_3[2]	0-500 µg/m³	2 µg/m³	±4 µg/m³	±2%	±4%	±1%	10 m	AR500/520
NO_3	0-500 µg/m³	0.1 µg/m³	±0.2 µg/m³	±2%	±4%	±1%	10 m	AR500/520
HNO_2	0-2000 µg/m³	1 µg/m³	±2 µg/m³	±2%	±4%	±1%	10 m	AR500/520
HF	0-2000 µg/m³	20 µg/m³	±40 µg/m³	±2%	±4%	±1%	10 m	AR520
Hg	0-2000 ng/m³	20 ng/m³	±40 ng/m³	±2%	±4%	±1%	10 m	AR500/520
H_2O	0-100 g/m³	0.2 g/m³	±0.4 g/m³	±2%	±4%	±1%	10 m	AR520
Styrene	0-2000 µg/m³	5 µg/m³	±10 µg/m³	±2%	±4%	±1%	10 m	AR500/520
CS_2	0-2000 µg/m³	20 µg/m³	±40 µg/m³	±2%	±4%	±1%	10 m	AR500/520
Cl_2[5]	0-10000 µg/m³	50 µg/m³	±100 µg/m³	±2%	±4%	±1%	10 m	AR500/520
Formaldehyde	0-2000 µg/m³	2 µg/m³	±4 µg/m³	±2%	±4%	±1%	10 m	AR500/520
Acetaldehyde	0-2000 µg/m³	20 µg/m³	±40 µg/m³	±2%	±4%	±1%	10 m	AR500/520
Phenol	0-2000 µg/m³	1 µg/m³	±2 µg/m³	±2%	±4%	±1%	10 m	AR500/520
Benzene	0-2000 µg/m³	1 µg/m³	±2 µg/m³	±2%	±4%	±1%	10 m	AR500/520
Toluene	0-2000 µg/m³	1 µg/m³	±2 µg/m³	±2%	±4%	±1%	10 m	AR500/520
p-, m-Xylene	0-2000 µg/m³	1 µg/m³	±2 µg/m³	±2%	±4%	±1%	10 m	AR500/520
o-Xylene	0-2000 µg/m³	10 µg/m³	±20 µg/m³	±2%	±4%	±1%	10 m	AR500/520
o-, m-, p-Cresol	0-2000 µg/m³	5 µg/m³	±10 µg/m³	±2%	±4%	±1%	10 m	AR500/520
C_6H_5Cl	0-2000 µg/m³	5 µg/m³	±10 µg/m³	±2%	±4%	±1%	10 m	AR500/520
$C_6H_4Cl_2$	0-2000 µg/m³	5 µg/m³	±10 µg/m³	±2%	±4%	±1%	10 m	AR500/520
LD500 Laser Diode Gas Analyser								
CO	0–100 mg/m³	100 µg/m³	±200 µg/m³	±2%	±4%	±1%	500 m	LD500
CO_2	0–100 g/m³	1 mg/m³	±2 mg/m³	±2%	±4%	±1%	500 m	LD500
NH_3	0–100 mg/m³	20 µg/m³	±40 µg/m³	±2%	±4%	±1%	500 m	LD500
HCl	0–100 mg/m³	20 µg/m³	±40 µg/m³	±2%	±4%	±1%	500 m	LD500
HF	0–10 mg/m³	1 µg/m³	±2 µg/m³	±2%	±4%	±1%	500 m	LD500
CH_4	0–100 mg/m³	50 µg/m³	±100 µg/m³	±2%	±4%	±1%	500 m	LD500
H_2O	0–100% vol.	0.1% vol.	±0.2% vol.	±2%	±4%	±1%	500 m	LD500

(1) When monitoring individual compounds, fibre optic cables of extended lengths are available.
(2) Based on 200 m path. Recommended monitoring path length: 100 to 200 m.
(3) Higher measurement ranges are possible depending on application and compound.
(4) Recommended monitoring path length: 300 to 800 m.
(5) Special precautions, contact Opsis.

- Besides the compounds above, the Opsis system monitors the following compounds: hydrogen cyanide (HCN), hydrogen bromide (HBr), hydrogen chloride (HCl), chlorine dioxide (ClO_2), carbon dioxide (CO_2), phosgene ($COCl_2$), ethylbenzene ($C_6H_5C_2H_5$), methane (CH_4), ethane (C_2H_6), ethylene (C_2H_4), acrylonitrile (CH_2=CHCN), 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene and others.

केन्द्रीय प्रदूषण नियंत्रण बोर्ड
CENTRAL POLLUTION CONTROL BOARD
(पर्यावरण एवं वन मंत्रालय, भारत सरकार)
(MINISTRY OF ENVIRONMENT & FORESTS, GOVT. OF INDIA)

No.C-47011/01/ICB/2007-08/Mat. Dt.17.11.2009

To

M/s.Opsis AB,
Box. 244,
S-24402, FURULUND,
Sweden.

Sub: Purchase order for supply of Automatic Ambient Air Quality Monitoring System (UV Based DOAS) with spares & accessories- reg.

Ref: i). Tender Notice No. C-47011/01-23/2007- 08/ICB/Materials dt.26.08.2008. (Item Code No. 01)
(ii) Your Bid /Proforma Invoice dt.8.09.2008.
(iii) Letter Nos.NU/QT/2008/159 dt.22.9.2008, 7.10.2009 & 3.11.2009 received from your Indian agent M/s.Nevco Engineers Pvt. Ltd. New Delhi-110 065.

Sirs,

I am directed to refer your Bid/Proforma Invoice dt.8.09.2008 and subsequent letter dt.22.9.2009,7.10.2009 & 3.11.2009 received from your Indian agent M/s.Nevco Engineers Pvt. Ltd. New Delhi-65 and to say that the Competent Authority, Central Pollution Control Board has accepted your rates for Automatic Ambient Air Quality Monitoring System UV based Differential Optical Absorption Spetroscopy Monitoring System Calibrated for NO,NO2, SO2, O3, BTX, Formaldehyde and Hg (USEPA approved). You are requested to supply the following items on the terms & conditions stipulated hereunder:-

Sr. No.	Cat. No.	Description	Qty. Rqd.	Total Amount in Swedish Krona
01	**SYS300ETX**	**UV-DOAS System Calibrated for NO,NO2,SO2,O3,BTX Formaldehyde and Hg consists of :-**	**01**	**669130.00**
02.	AR 500S	Analyzer	01	
03.	ER110	Emiter & Receiver	01	
04	PS 150	Power Supply	01	
05.	OF 605-5	Software	01	
06.	UP ER 150	Upgrade of ER 110S to ER 150	01	
07.	IG 002	Calibration for, Hg	02	
08.	WV 020	Wall mounted unit	01	
09.	TM 001	Temperature input Module	01	
10.	WM002	WIND INPUT MODULE	01	
11.	104 001	Analogue in/out module	04	

NATIONAL ENVIRONMENTAL ENGINEERING RESEARCH INSTITUTE
(Council of Scientific & Industrial Research)
Nehru Marg,
NAGPUR – 440 020 (M.S.) INDIA
Fax - 0712- 2249992 , Telephone: 0712-2249885-88 & 2249970-72,
By Registered Air Mail

PURCHASE ORDER

P.O. No.: PUR-55F/2009 **Date : 29.01.2010**

To :
M/s. OPSIS AB,
Box 244, SE-244 02
FURULUND,
SWEDEN

Sub.: Procurement of Differential Optical Absorption Spectrophotometer
Ref.: Quotation No. **NV/MH/QT/14282 Dated 14.08.2009**

Dear Sirs,

I am directed to request you to arrange for supply of the below mentioned materials as per the terms & conditions stipulated in this Order :

Sr. No.	Items	Qty.	Rate (In SEK)	Total Cost (In SEK)
1	SYS300EXT : UV- Differential Optical Absorption Spectrophotometer (DOAS) system, including AR520 Analyser calibrated for NO2, SO2, O3, NH3, CO2, CH4 and BTX with signal Handling system, built-in modem	1 No.	6,49,605.00	6,49,605.00
2	ER150 : Receiver DR150 with auto alignment	1 No.	1,33,600.00	1,33,600.00
3	EM 150: Emitter EM150 with auto alignment	1 No.	1,33,600.00	1,33,600.00
4	PS 150 : Power Supply	1 No.	50,160.00	50,160.00
5	OF60R3: 5 mt long optic fibre cable	1 No.	19,090.00	19,090.00
6	WL020: Wallmount unit	1 No.	11,676.00	11,676.00
7	ST002 : Temperature sensor for cabinet temperature	1 No.	2,880.00	2,880.00
8	DM016: Digital in/out module	1 No.	3,800.00	3,800.00
9	LT-REPORTER : Enviman reporter	1 No.	20,990.00	20,990.00
10	LT-COMVEnviman Comvisioner LT	1 No.	20,990.00	20,990.00
	Following items/services Free of cost by Indian Agent to be supplied/provided locally **1) Laptop with Intel Core 2 Duo Processor, 320 GB HDD, 4 GB RAM, DVD Writer, 2.2 GHz, 17" wide-bright view screen, Dell Studio 17 or equivalent with color Laserjet Printer CP1210 or equivalent** **2)Demo of DOAS at Vizag with to and Fro travel and lodging boarding for Two NEERI Scientists for one day** **3) One year free Service and calibration with NEERI gases (2 services)** **4) Airconditioned cabinet for DOAS**			**10,46,391.00**
			(-) Discount 2% SEK	**20,928.00**
			FOB Furulund, Sweden value SEK	**10,25,463.00**

NOTE: 1. PLEASE DO NOT SHIP THE CONSIGNMENT OTHER THAN FREIGHT FORWARDER SPECIFIED IN THIS PURCHASE ORDER.
2. PLEASE STRICTLY ADHERE TO THE TERMS & CONDITIONS STIPULATED IN THIS PURCHASE ORDER.
3. PLEASE REFER ANNEXURE A,B, & C & ANNEXURE – I FOR TERMS AND CONDITIONS.

DELHI POLLUTION CONTROL COMMITTEE
DEPARTMENT OF ENVIRONMENT, (GOVT. OF NCT OF DELHI)
4TH FLOOR, ISBT BUILDING, KASHMERE GATE, DELHI-6
visit us at : http://dpcc.delhigovt.nic.in

No. DPCC/Lab/A/09/2958

Dated 10.10.2010

To,

M/S Opsis AB
Box No 244
S-24402, Furuland ,
Sweden.

Sub.: Purchase order for supply of TWO Automatic Ambient Air Quality Monitoring System (UV Based DOAS) with spare & accessories- reg.

Ref: (i) Tender Notice No. C-47011/01-23/2007-08/Icb/Materials dt. 26.08.2008. (Item Code NO. 01).
(ii) Your Bid/ Performa Invoice dt. 08.09.2008 submitted to CPCB.
(iii) your letter NV /2009/516 and your latter dated 29.12.09

Sirs,

I am directed to refer your Bid/Performa Invoice dated 08.09.2008 and subsequent letters dated 22.09.2009, 07.10.2009 & 03.11.2009 received from your Indian agent M/s Nevco Engineer Pvt. Ltd. New Delhi-65 and your willingness to accept the order from this organization also, Competent authority in this organization has accepted your rates for Automatic Ambient Air Quality Monitoring System Calibrated for NO. NO2, SO2, O3, BTX, Formaldehyde (USEPA approved) Ammonia, CO and Particulate PM_{10} and $PM_{2.5}$ (for simultaneous continues monitoring). You are requested to supply the following items on the terms & conditions stipulated thereunder:-

Basic System using UV- DOAS for monitoring of NO,NO_2,SO_2,O_3 BTX Formaldehyde, HG and NH_3

ITEM NO.1

Qty	Item	Description
1	SYS300EXT	UV- DOAS system calibrated for No,NO2 SO2 O3 BTX, formaldehyde and Hg consisting of
1	AR500S	Analyser
1	ER110	Emitter and Receiver
1	PS150	Power Supply
1	OF60S-5	Optic Fiber Cable
1	UP-ER 150	Upgrade of ER 110S to ER150
2	IG002	Calibrators for HG

INSTALLATION

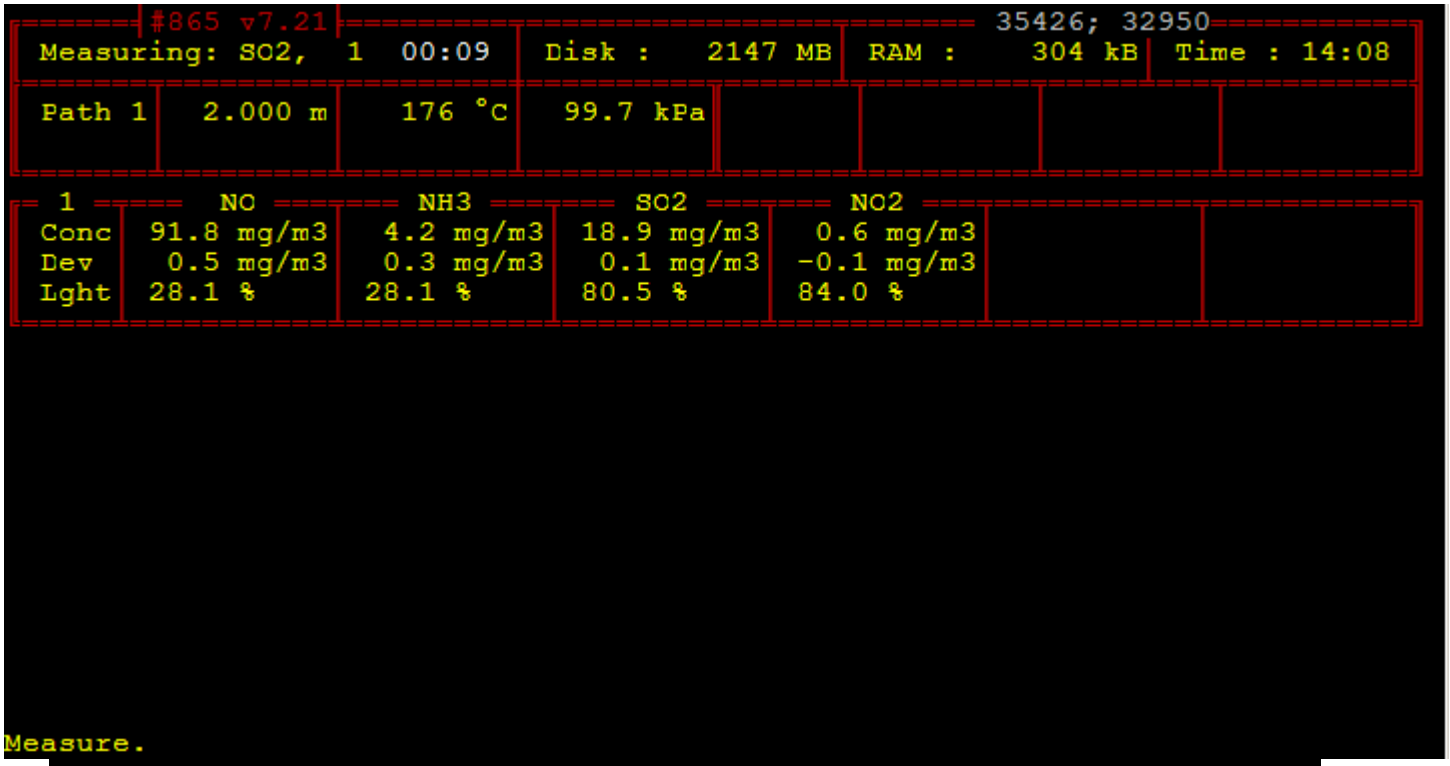
&

USER LIST--AQMs

CLOSE VIEW OF THE ANALYSERS ROOM.

Analyser software

Measurement screen



Conc = an averaged value of thousands of measurements
Dev = standard deviation of concentration values
Light = a light intensity value of each gas

SGS ANALYSER AR600 SO2

CLOSE VIEW OF THE ANALYSERS ROOM.

NEWS IN THE HINDU, PAGE 8, SEPTEMBER 30' 2010

A station to keep tabs on air quality

Staff Reporter

NEW DELHI: An automatic air monitoring station has been inaugurated at Indira Gandhi International Airport here.

"Four more stations will be inaugurated at Vikas Bhawan-II, a major office complex of the Delhi Government in Civil Line Area in Northern Ridge; Sarvodaya Kanya Vidyalaya, Punjabi Bagh; NP Senior Secondary School, Mandir Marg; and Anand Vihar Bus Terminal," said Delhi Chief Secretary Rakesh Mehta inaugurating the new station.

He said the Delhi Pollution Control Committee has been striving hard to monitor air quality by commissioning a reliable ambient air monitoring network in the Capital.

Meanwhile, a conventional ambient air monitoring station at Kendriya Vidyalaya in Sector-2 of R.K. Puram was also inaugurated on Tuesday.

The station at Delhi airport is the first at any airport in South-East Asia. It will disseminate data on critical parameters and direct it to DPCC regularly at an interval of 15 minutes. The data is expected to help in formulation of government policies. The data is available in public domain on the DPCC website *dpcc.delhigovt.nic.in* and on *www.dpccairdata.com*. The station will be functional round-the-clock even in the worst weather.

"The station at IGI Airport is unique in the sense that it is the first real-time ambient air monitoring station and the only one operational for collection of 12 parameters anywhere in the world. All the latest parameters including PM10, PM2.5, sulphur dioxide, nitrogen dioxide, nitrogen oxide, carbon monoxide, ammonia, benzene, toluene, P-xylene can be monitored at this station. Further samples could be collected for more analysis for arsenic, nickel and lead," added Mr. Mehta.

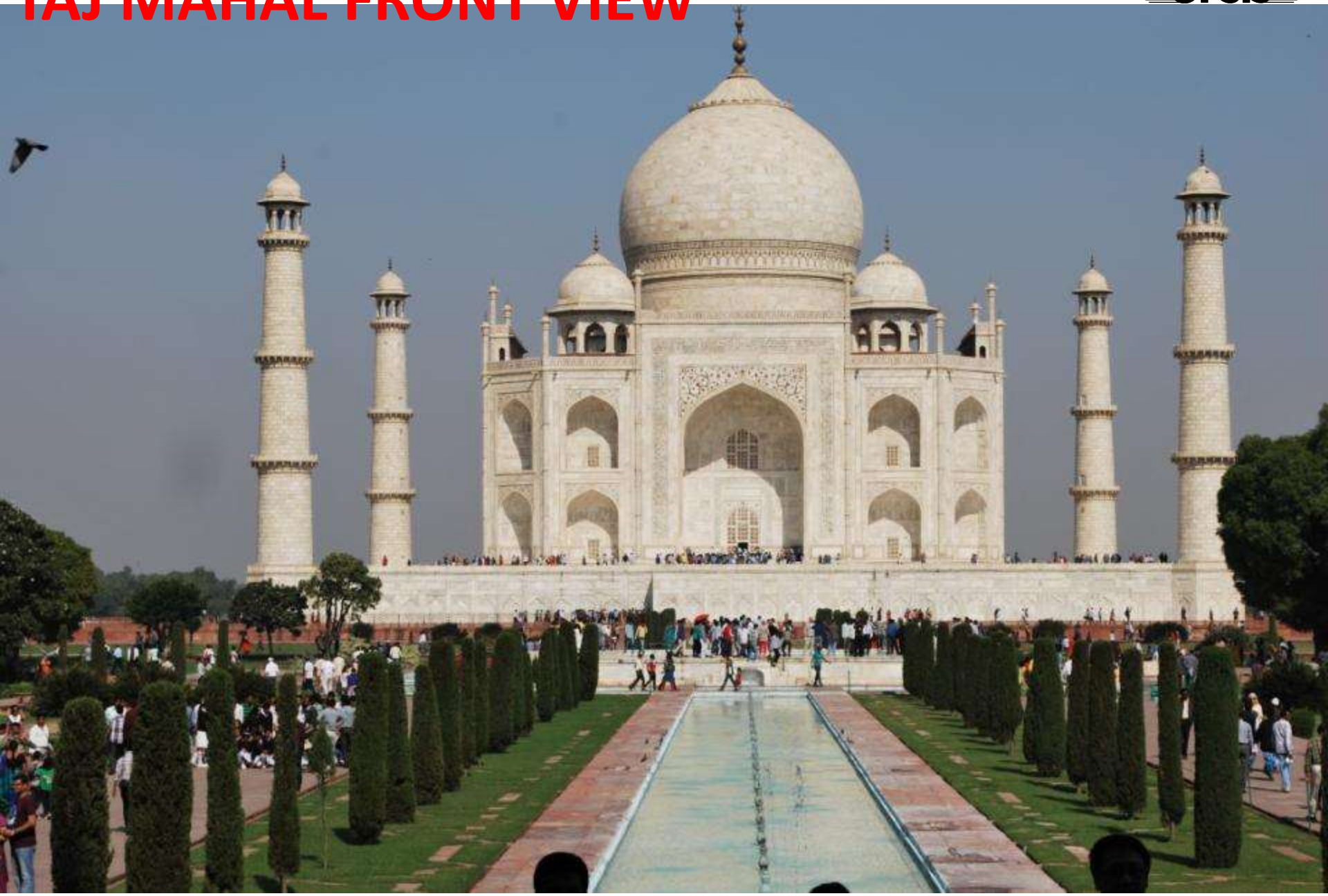
He said the Delhi Government is likely to conduct a study to make Delhi a carbon-neutral city.

AIRPORT INSTALLATIONS

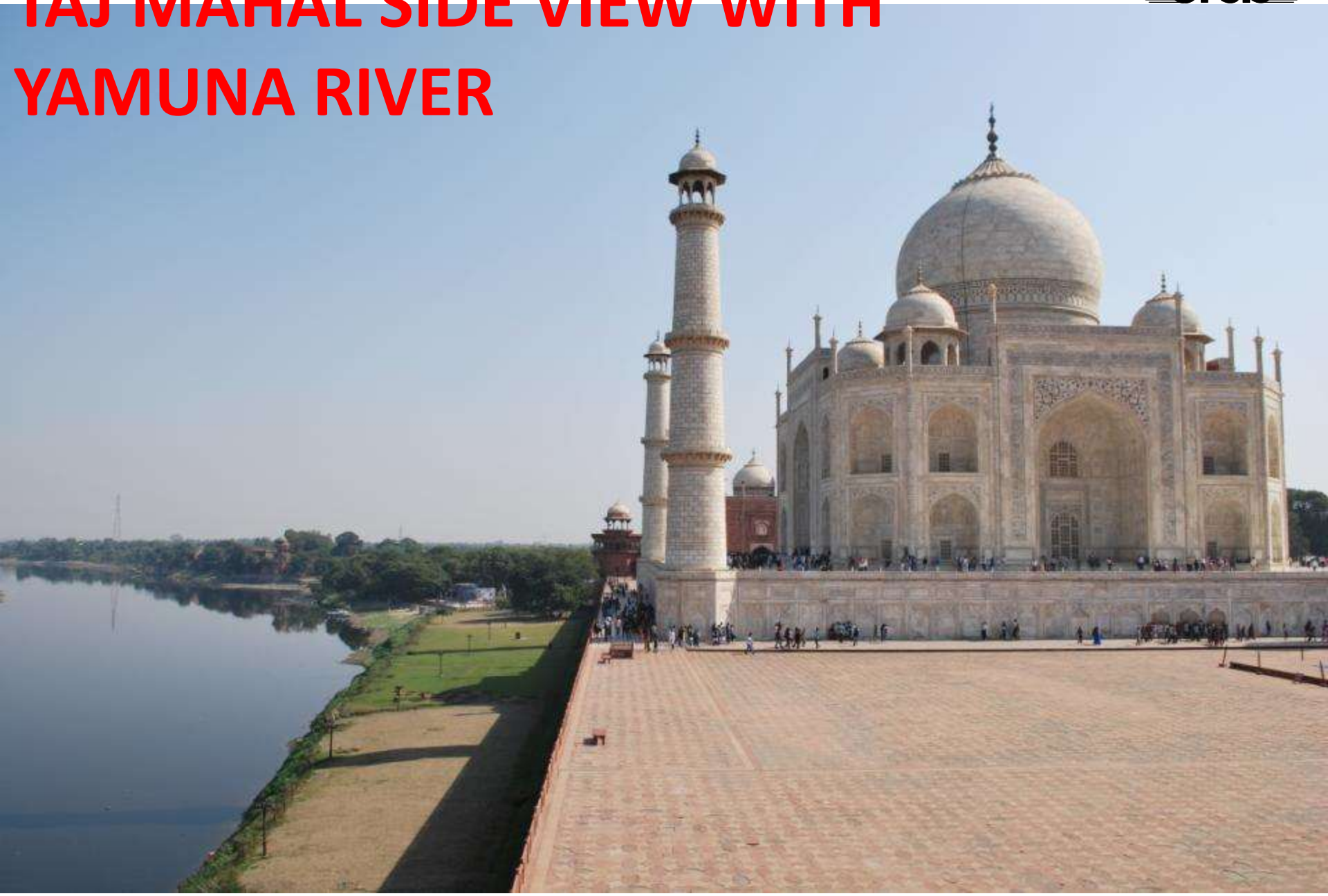
..and
Athens, Greece
Munich, Germany
Thessaloniki,Greece
Korfu , Greece
Rhodos,Greece
Geneva, Switzerland
Tunis, Tunisia
and more..

TORONTO, CANADA

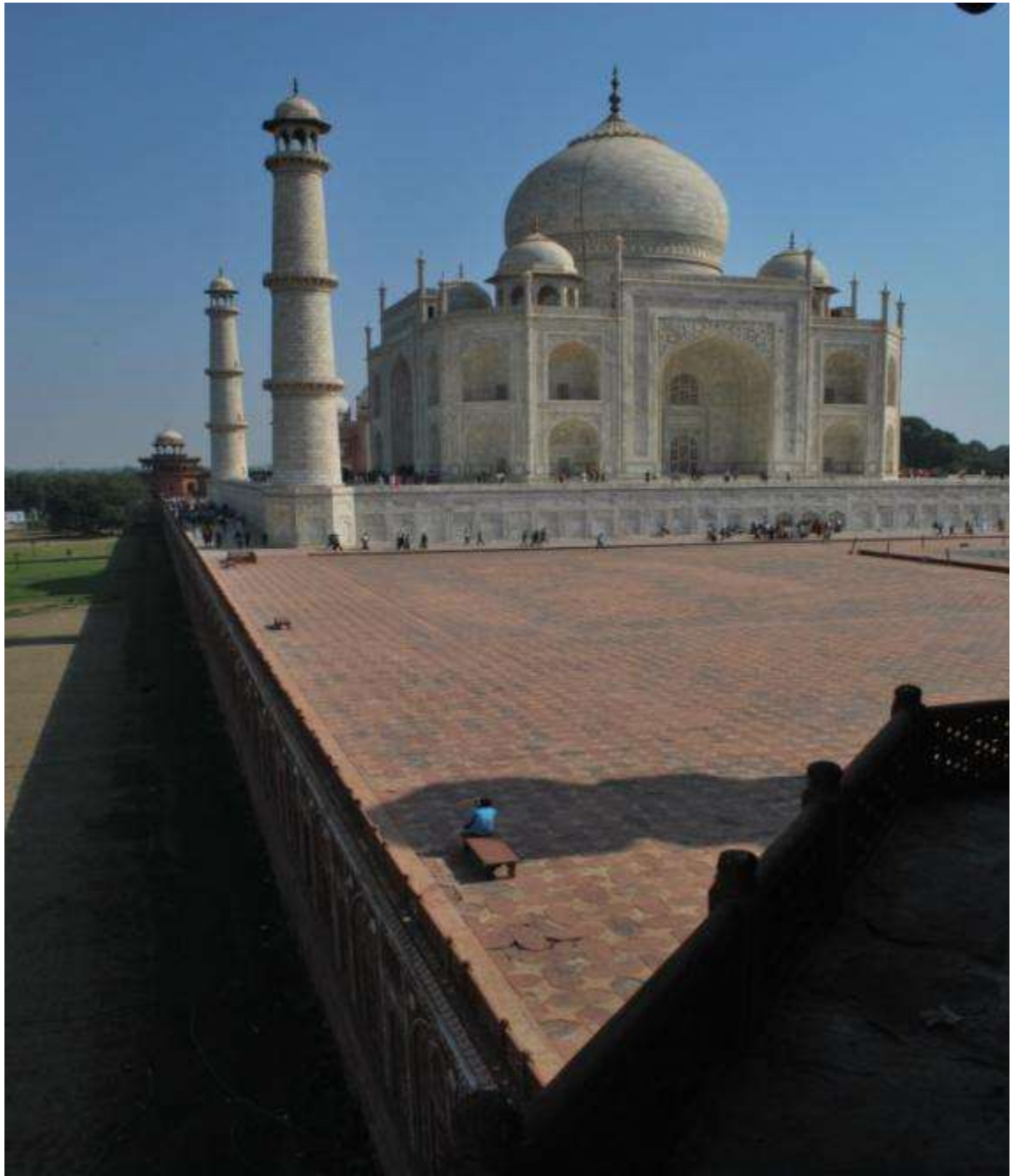
TAJ MAHAL FRONT VIEW



TAJ MAHAL SIDE VIEW WITH YAMUNA RIVER



SELECTING LOCATION FOR OPSIS OPEN PATH AAQM STATION



SITE SELECTION FOR OPEN PATH CAAQM STATION WITH Mrs.Padmas,

Head- Environment of NEERI,NAGPUR
at TAJ MAHAL

The Cathedral of Milano

Cathedral of Florence (from Palazzo Vecchio)

Cango Caves , South Africa

The Civic Arena (the Dome) , Pittsburgh, USA

The Tower Bridge, London, UK

Acropolis, Athens, Greece

The Red Square, Moscow, Russia


OPSIS
AR500S

Pattaya City,Thailand, installed 2006, NO,NO2,SO2,O3,BTX

CALIBRATION

CALIBRATION KIT

Rotameter
(flow control)

Calibration
gas

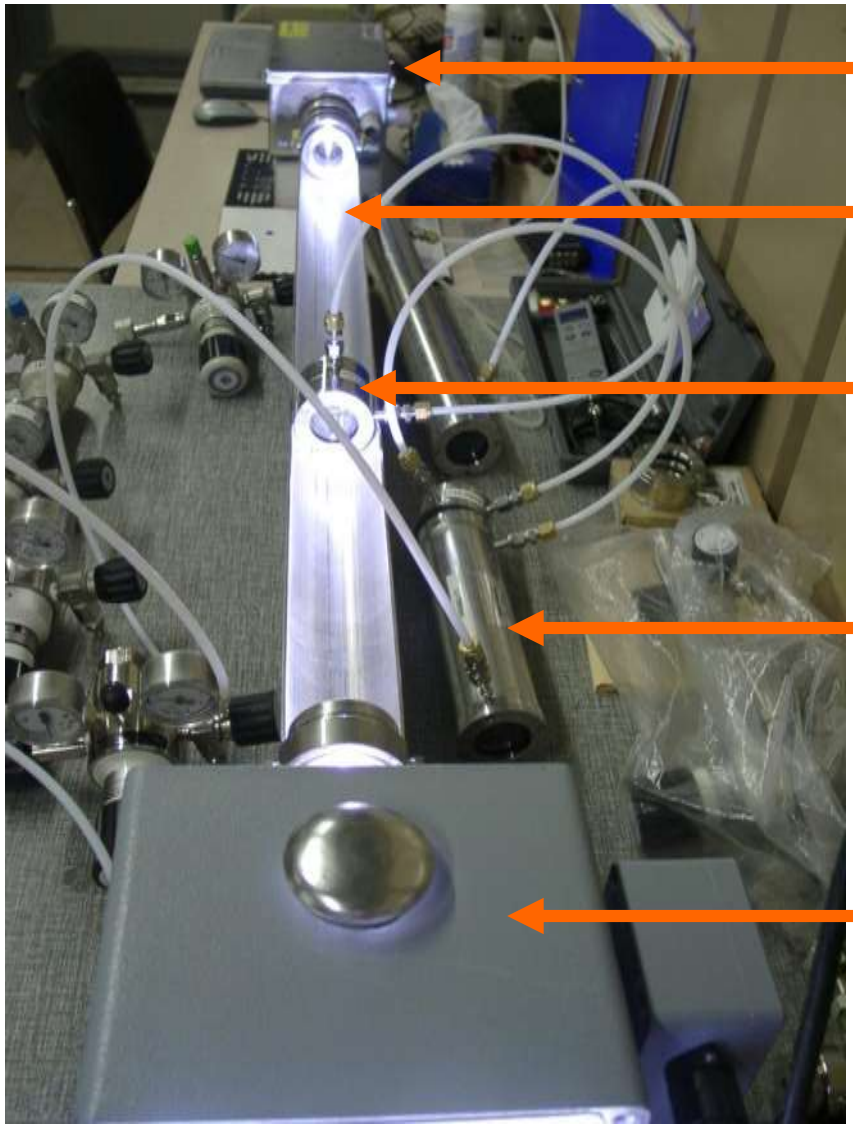
Receiver

Emitter with
Xe lamp

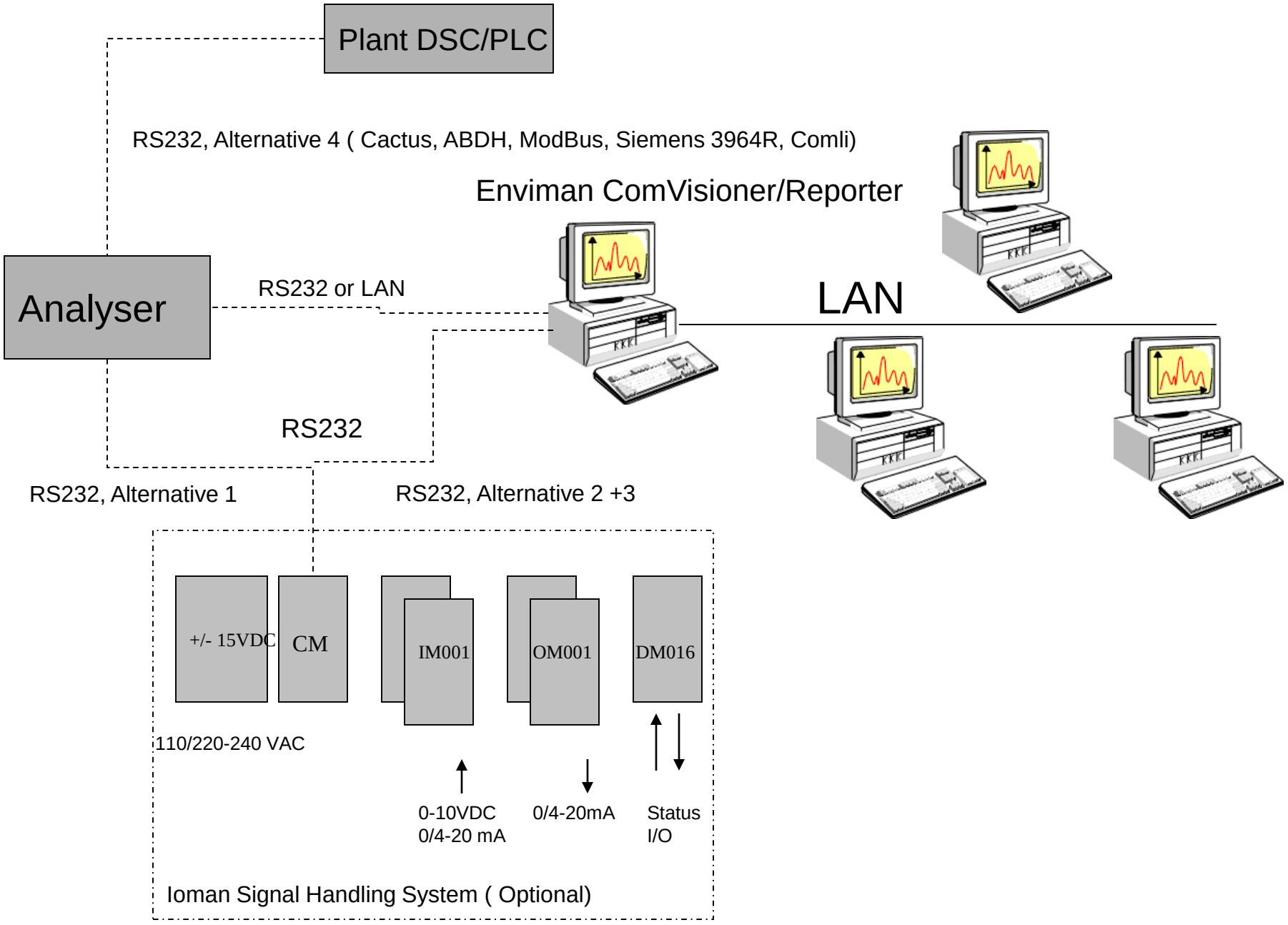
Calibration bench

Gas valves

SETUP OF CALIBRATION BENCH



SIGNAL/COMMUNICATION



CONNECTIVITY TO STATE PCB & CPCB

WEB TRANSFER WT256 IN AQM APPLICATIONS

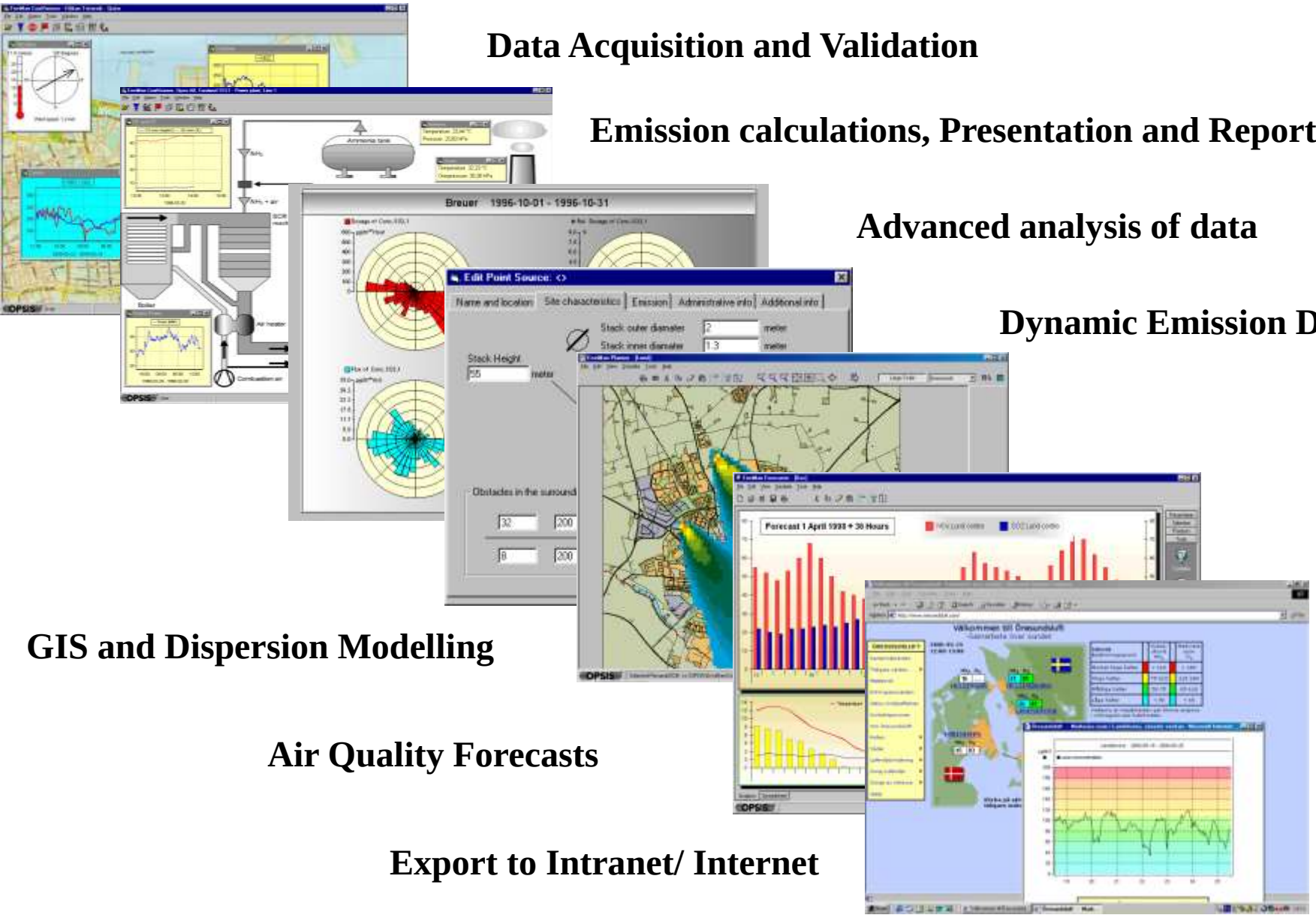
SOFTWARE TOOLS

Data Acquisition and Validation

Emission calculations, Presentation and Reporting

Advanced analysis of data

Dynamic Emission Database



GIS and Dispersion Modelling

Air Quality Forecasts

Export to Intranet/ Internet

OPSIS OFFER YOU :

- **COMPLETE AQM, CEM SOLUTIONS**
- **QUALITY ASSURANCE AND CONTROL FUNCTIONS**
- **DATA PRESENTATION, VALIDATION AND REPORTING**
- **TRAINED AND EXPERIENCED DISTRIBUTORS**

REFERENCES IN INDIA

OPSIS ANALYSER REFERENCE IN INDIA

Stack Emission Monitoring CEMS : UV/IR Technology Reference list in India

Sr.No.	Reference Customer list	Process (Stack)Gas	Qty	Contact Person	Contact Details.	In India Installation Since	Parameters Monitored
1	SAINT GOBAIN GLASS -FLOAT-1,CHENNAI	AR600--UV ANALYSER	1	Mr. Sankar Vadivel.	9840261672	2001	NO,NO2,NOX,SO2
2	SAINT GOBAIN GLASS -FLOAT-1,CHENNAI	AR650--IR ANALYSER	1	Mr. Sankar Vadivel.	9840261672	2001	CO,HF.
3	SAINT GOBAIN GLASS FLOAT-2,CHENNAI	AR600--UV ANALYSER	1	Mr. Sankar Vadivel.	9840261672	2006	NO,NO2,NOX,SO2
4	SAINT GOBAIN GLASS FLOAT-2 CHENNAI	AR650--IR ANALYSER	1	Mr. Sankar Vadivel.	9840261672	2006	CO,HF.
5	RAIN CALCINING LTD ,VIZAG	AR600--UV ANALYSER	1	Mr. Bhupal.	9491782943	2006	SO2.
6	STERLITE INDUSTRIES,TUTICORIN	AR600--UV ANALYSER	1	Mr. Vishwanathan.	8220054081	2008	SO2.
7	RAMKY ENVIRO --HYDERABAD	AR650--IR ANALYSER	1	Mr.Tiwari	8008091313	2010	TOC & HCL.
8	RAIN CII CARBON ,VIZAG	AR600--UV ANALYSER	1	Mr. Bhupal.	9491782943	2010	SO2.
9	STERLITE INDUSTRIES,TUTICORIN	AR650--IR ANALYSER	1	Mr. Vishwanathan.	8220054081	October,2010.	SO2.
10	DUCON TECHNOLOGIES ,MUMBAI	AR600--UV ANALYSER	1	Mr.R.Ramchandran.	022-41122154.	September,2011.	SO2.
11	FIRMENICH AROMATICS ,DAHEJ,GUJRAT	AR600--UV ANALYSER	1	Mr.Ajay Singh.	9099036214	October,2011.	SO2,NO,NO2,H2O,
12	FIRMENICH AROMATICS ,DAHEJ,GUJRAT	AR650--IR ANALYSER	1	Mr.Ajay Singh.	9099036214	October,2011.	CO,HCL,CL2,CH4,THC.
13	STERLITE INDUSTRIES, TUTICORIN	AR600--UV ANALYSER	1	Mr. Vishwanathan.	8220054081	October,2011.	SO2.
14	SURANA INDUSTRIES,KARNATAKA	AR600--UV ANALYSER	5	Mr.Meyelvel.	8867504868	November,2011.	SO2, NO, NO2
15	NATIONAL ALUMINUM CO- CPP-ANGUL	AR600--UV ANALYSER	1	Mr.Khamari.	9437021131	February,2012.	SO2 & NOX
16	GEA PROCESS ENGINEERING,MUMBAI	AR600--UV ANALYSER	1	Mr.Avijit Sinha.	9833379538	May,2012.	SO2 & SO3.
17	DR. REDDY LAB--MIRYALGUDA,A.P.	AR620-- UV/IR ANALYSER	1	Mr.Narsimhan	9441922090	December,2012.	SO2, NO, NO2, CO, CO2, O2, SPM
18	WEST COAST PAPER MILLS KARNATAKA	AR600--UV ANALYSER	5	Mr.A.K.Maithani.	9916910546	December,2012.	SO2, NOX, H2S.
19	ACC Ltd;Madukarai, Tamilnadu	AR600--UV ANALYSER	1	Mr. Rajalingam.	7708010638	December,2013	SO2,NOX.
20	ADITYA BIRLA CHEMICALS,JHARKHAND	AR620-- UV/IR ANALYSER	1	Mr.K.N.Mishra	9431527613	April,2014	SO2,NO,NO2,NOX,CO
21	ADITYA BIRLA CHEMICALS,JHARKHAND	AR600-- UV ANALYSER	1	Mr.K.N.Mishra	9431527613	April,2014	CL2
22	SRF Limited,Dahej, Gujarat	AR600--UV ANALYSER	1	Mr.Jagdish Pranami	9737040382	September,2014	SO2,NOX.
23	NATIONAL ALUMINUM CO- CPP-ANGUL	AR600--UV ANALYSER	1	Mr.N R Mohanty	9437055607	November,2014	SO2 & NOX
24	SPIC, TUTICORIN	AR600--UV ANALYSER	1	Mr.Prem Anand Raj	0461-2355599	November,2014	SO2
25	Pidilite industries,Vapi,Gujarat	AR600--UV ANALYSER	1	Mr.Abhijeet	9768957699	November,2014	SO2,NOX.
26	MAITHAN ISPAT LTD	AR600--UV ANALYSER	2	Mr.Saswat	9437018037	December,2014	SO2, NOX
27	CHEMFAB ALKALIES LTD	AR600--UV ANALYSER	1	Mr.Jeyachander	9489648402	December,2014	CL2
28	CHEMFAB ALKALIES LTD	AR650--IR ANALYSER	1	Mr.Jeyachander	9489648402	December,2014	HCL
29	NATIONAL ALUMINUM CO. LTD- CPP-ANGUL	AR600--UV ANALYSER	2	Mr.N R Mohanty	9437055607	January,2015	SO2, NOX IN 4 STACKS
30	STERLITE INDUSTRIES,TUTICORIN	AR600--UV ANALYSER	1	Mr.Ramesh Ganesh	8220054142	January,2015	SO2- ADD PATH
31	EMMAMI PAPER LIMITED	AR600--UV ANALYSER	2	Mr.M.M.Samal	8763949764	January,2015	SO2, NOX- CEMS
32	SYNGENTA GOA	AR600--UV ANALYSER	2	Mr.Naveen	8323049283	February,2015	SO2
33	MONNET ISPAT & ENERGY LIMITED	AR600--UV ANALYSER	2	Mr.Sunil Khushuwa	9993718955	March,2015	SO2& NOX AND SO2
34	NATIONAL ALUMINUM CO. LTD-CPP-ANGUL	AR600--UV ANALYSER	1	Mr.N R Mohanty	9437055607	March,2015	SO2, NOX IN 2 STACKS
35	IFFCO-KANDLA	AR620-- UV/IR ANALYSER	1	Mr.BJ JOSHI	9408244673	March,2015	SO2, NOX IN 2 STACKS
36	ACC- WADI	AR600--UV ANALYSER	3	Mr.Satyanarayana	9480686389	April,2015	SO2, NO, NO2
37	BIRLA CEMENT-CHITORGARH	AR600--UV ANALYSER	3	Mr.M.M.Sheikh	9414396786	April,2015	SO2, NO, NO2
38	BASF	AR600--UV ANALYSER	1	Mr.Nishant	9687679747	April,2015	SO2
39	AARATI INDUSTRIES LIMITED	AR620-- UV/IR ANALYSER	1	Mr.Vinod patil	9727782288	May,2015	SO2, NOX, HF
40	SRI KALAHASTI PIPES LTD	AR602Z--UV ANALYSER	1	Mr.Jothi	9849635316	August,2015	SO2, NO, NO2,NOX

Laser Diode Technology Reference list in India

Sr.No.	Reference Customer list	CEMS/AQMS	Qty	Contact Person	Contact No. Details.	In India Installation Since	Parameters Monitored
41	HINDALCO INDUSTRIES LTD,HIRAKUD	LDS00: HF : 4 Stacks	2	Mr.Saroj	9090092349	2008	HF
42	STERLITE INDUSTRIES,TUTICORIN	LDS00:02 Nos.(HF)	2	Mr. Vishwanathan.	8220054081	2008	HF

43	HINDALCO INDUSTRIES LTD,RENUKOOT	LDS00:01 No.(HF,CL2)	1	Mr.Anil Singh.	9889031862	2010	HF,CL2
44	STERLITE INDUSTRIES,TUTICORIN	LDS00:01 No.(O2)	1	Mr. Vishwanathan.	8220054081	October,2011.	O2
45	HINDALCO INDUSTRIES LTD-BIRLA COPPER	LDS00:01 No.(HF)	1	Mr. Ajay Sharma.	9723709826	May,2012.	HF
46	ADITYA BIRLA CHEMICALS,JHARKHAND	LDS00:01 No.(HCL)	1	Mr.K.N.Mishra	9431527613	April,2014	HCL
47	HINDALCO INDUSTRIES LTD,HIRAKUD	LDS00: HF : 2 POT ROOMS	2	Dr. Panda	9090092349	April,2014	HF
48	IFFCO,KANDLA	LDS00:NH3 : 6 STACKS	2	Mr.BJ JOSHI	9408244673	December,2014	NH3
Ambient air quality (UV/IR) Technology Ref.list in India							
Sr.No.	Reference Customer list	Ambient Air : UV/IR	Qty	Contact Person	Contact No. Details.	In India Installation Since	Parameters Monitored
49	ANDHRA PETROCHEMICALS LTD,A.P.	AR500	1	Mr.Raju	08912891415	2009	SO2, NO2, O3, BTX
50	Central Pollution Control Board,New Delhi	AR500	1	Mr.Gurnam Singh	9891301133	2009	SO2, NO2, O3, BTX,Hg, FORMALDEHYDE
51	DELHI POLLUTION CONTROL COMMITTEE – civil lines ,Delhi	AR500	1	Dr.George	9717593520	2010	SO2, NO2, O3, BTX, FORMALDEHYDE, Hg, NO,CO SM200 FOR PM 10 & PM2.5
52	DELHI POLLUTION CONT. COMMITTEE – International. Airport,Delhi	AR500	1	Dr.George	9717593520	2010	SO2, NO2, O3, BTX, FORMALDEHYDE, Hg, NO,CO SM200 FOR PM 10 & PM2.5
53	NATIONAL ENVIRONMENTAL ENGINEERING RESEARCH INSTITUTE, NAGPUR	AR520	1	Dr.K.V.George.	9422305272	2010	SO2, NO2, O3, BTX, CO2 & CH4
54	HINDALCO INDUSTRIES,RENUKUT,U.P.	AR500	1	Mr.Anil Singh	9889031862	2010	SO2,NO2,O3,HG,HF,CL2, PM10, PM2.5
55	Dr.Reddys Laboratories Hyderabad,A.P.	AR500	1	Mr.M.V.S.Raju	9989058857	October,2011	SO2, NO2,PM1O,PM2.5
56	Dr.Reddys Lab Vijianagaram,A.P.	AR500	3	Mr.Srinivas Raju	7702001939	October,2011	SO2, NO2,PM1O,PM2.5
57	SURANA INDUSTRIES LTD,Karnataka	AR500	1	Mr.Meyelvel.	8867504868	November,2011	SO2,NO2,CO,PM10,PM2.5.
58	ESSAR STEELS- VIZAG,A.P.	AR500	1	Mr.K.Satyaprasad	9885188011	December,2011	SO2, NO2, PM10 & PM2.5
59	RELIANCE JAMNAGAR LTD,Gujarat	AR500	1	Mr.Anand Sutaria.	9998214955	January,2012	SO2, NO2, NH3, O3, BENZENE, PM2.5
60	EMAMI PAPER LTD,Orissa	AR500	1	Mr.M.M.Samal	8763949764	March,2012	SO2,NO2,O3,CO,PM10, PM2.5
61	Dr.Reddys Lab- Mirayguda,A.P.	AR500	3	Mr. Narsimhan.	9441922090	May,2012	SO2,NO2,O3,NH3, PM1O, PM2.5
62	KALYANI STEELS LIMITED,Karnataka	AR500	1	Mr. Krishna	8904763004	August,2012	SO2,NO2, O3, CO, PM10 & PM2.5
63	ADITYA BIRLA CHEMICALS,JHARKHAND	AR500	1	Mr.K.N.Mishra	9431527613	October,2012	SO2,NO2,O3,PM10,PM2.5
64	WEST COAST PAPER MILLS LTD,Karnataka	AR500	4	Mr.A.K.Naithani.	9916910546	December,2012	SO2,NO2,H2S,PM10,PM2.5
65	SHRI GIRIJA ALLOYS & POWER LTD,A.P.	AR500	1	Mr. Adarsh	9866331188	July,2013	SO2, NO2, PM10, PM2.5
66	VICAT SAGAR CEMENT LTD,Karnataka	AR500	1	Mr. Sunil Kusture	9663786281	August,2013	SO2, NO2, PM10, PM2.5
67	DR. REDDY LAB-SEZ- SRIKAKULAM,A.P.	AR500	1	Mr. M. Srinavas Raju.	7702001939	September,2013	SO2,NO2,NH3,VOC,PM10,PM2.5.
68	MUKAND LIMITED,Karnataka	AR500	1	Mr.Krishna.	9448285901	September,2013	SO2,NO2,O3,CO,PM10,PM2.5.
69	OIL INDIA LIMITED,A.P.	AR520	1	Mr.M.M.Samal.	9493177023	September,2013	SO2,NO2,NH3,CH4,Hg,BTX, CO,PM10,PM2.5.
70	SIMHAPURI ENERGY LTD,A.P.	AR500	1	Mr. Venkateshwarlu	8008700109	September,2013	SO2,NO2,CO,PM10,PM2.5.
71	ESSAR STEELS- VIZAG,A.P.	AR500	1	Mr. Satya Prasad.	9885188011	February,2014	SO2,NO2,PM10,PM2.5
72	KAMINENI STEEL & POWER INDIA PVT LTD	AR500	1	Mr.Chawda	9490493482	June,2014	SO2,NO2,PM10,PM2.5
73	MEENAKSHI ENERGY PVT LTD , NELLORE,A.P.	AR500	2	Mr.Madhusudan Rao	9985708181	November,2014	SO2,NO2,PM10,PM2.5
74	MUKAND LIMITED	AR500	1	Mr. Krishna	8904763004	December,2014	SO2, NO2
75	KALYANI STEELS LIMITED	AR500	1	Mr. Krishna	8904763004	December,2014	SO2, NO2
76	STAR CEMENT	AR500	1	Mr.Rout	8974010164	January,2015	SO2, NO2
77	ADANI GROUP	AR500	1	Mr.Mahesh	8980016144	January,2015	SO2, NO2, PM10, PM2.5
78	EMMAMI PAPER LIMITED	AR500	2	Mr.M.M.Samal	8763949764	January,2015	SO2, NO2, CO, PM10 & PM2.5 - AQM, SO2, NOX- CEMS
79	THANE MUNICIPAL CORPORATION	AR500	1	Mrs.Pradhan	9920401576	March,2015	SO2, NO2,O3, PM10
80	IFFCO,KANDLA	AR500	1	Mr.BJ JOSHI	9408244673	March,2015	SO2, NO2, PM10, PM2.5

81	TAMILNADU AGRICULTURAL UNIVERSITY	AR500	1	Mr.Balasubramanian	9443505845	March,2015	SO2, NO2,O3, CO, PM2.5, CO2
82	PIONEER GAS POWER LIMITED	AR500	1	Mr.V.N.S.S.R.T. Prasad	040-23542895	July,2015	SO2, NO2, O3, PM10, PM2.5
83	TAMILNADU NEWSPRINT AND PAPERS LTD	AR500	1	Mr.Subramaniam,Chief Manager--Env	04324277016	August,2015	SO2, NO2,CO,PM10, PM2.5
Ambient air quality PM 10/2.5 Ref.list in India							
Sr.No.	Reference Customer list	Ambient Air : PM10/2.5	Qty	Contact Person	Contact No. Details.	In India Installation Since	Parameters Monitored
84	HY GRADE PILLET(ESSAR STEEL),A.P.	SM200	1	Mr.K.Satyaprasad	9885188011	2006	PM10,PM2.5
85	KERALA SPONGE IRON LTD,KERALA	SM200	1	Mr.Joy.	9446536355	2007	PM10,PM2.5
86	ASHAPURA MINECHEM LTD,KERALA	SM200	1	Mr.Suresh Kootala.	9820715153	2007	PM10,PM2.5
87	ANDHRA PETROCHEMICALS LTD,A.P.	SM200	1	Mr.Raju	08912891415	2009	PM10,PM2.5
88	DELHI POLLUTION CONTROL COMMITTEE -- civil lines ,Delhi	SM200	2	Dr.George	9717593520	2010	PM10,PM2.5
89	DELHI POLLUTION CONT. COMMITTEE -- International. Airport,Delhi	SM200	2	Dr.George	9717593520	2010	PM10,PM2.5
90	HINDALCO INDUSTRIES,RENUKUT,U.P.	SM200	1	Mr.Anil Singh	9889031862	2010	PM10,PM2.5
91	PARASAKTI CEMENT,A.P.	SM200	2	Mr.Kanan	9652226227	July,2011	PM10,PM2.5
92	SREE JAYAJYOTHI CEMENTS,A.P.	SM200	4	Mr.Bhaskar	8978902012	August,2011	PM10,PM2.5
93	Dr.Reddys Laboratories Hyderabad,A.P.	SM200	2	Mr.M.V.S.Raju	9989058857	October,2011	PM10,PM2.5
94	Dr.Reddys Lab Vijianagaram,A.P.	SM200	2	Mr.Srinivas Raju	7702001939	October,2011	PM10,PM2.5
95	India Cements Ltd- Malkapurram,A.P.	SM200	2	Mr.Ramakrishna	9491035377	October,2011	PM10,PM2.5
96	SURANA INDUSTRIES LTD,Karnataka	SM200	2	Mr.Meyelvel.	8867504868	November,2011	PM10,PM2.5
97	ESSAR STEELS- VIZAG,A.P.	SM200	2	Mr.K.Satyaprasad	9885188011	December,2011	PM10,PM2.5
98	RELIANCE JAMNAGAR LTD,Gujarat	SM200	1	Mr.Anand Sutaria.	9998214955	January,2012	PM10,PM2.5
99	EMAMI PAPER LTD,Orissa	SM200	2	Mr.M.M.Samal	8763949764	March,2012	PM10,PM2.5
100	Dr.Reddys Lab- Mirayguda,A.P.	SM200	6	Mr. Narsimhan.	9441922090	May,2012	PM10,PM2.5
101	PARASAKTI CEMENT,A.P.	SM200	2	Mr. Phani.	986631842?	May,2012	PM10,PM2.5
102	KALYANI STEELS LIMITED,Karnataka	SM200	2	Mr. Krishna	8904763004	August,2012	PM10,PM2.5
103	ADITYA BIRLA CHEMICALS,JHARKHAND	SM200	2	Mr.K.N.Mishra	9431527613	October,2012	PM10,PM2.5
104	WEST COAST PAPER MILLS LTD,Karnataka	SM200	8	Mr.A.K.Naithani.	9916910546	December,2012	PM10,PM2.5
105	India Cements Ltd- Malkapurram,A.P.	SM200	2	Mr.Ramakrishna	9491035377	December,2012	PM10,PM2.5
106	SHRI GIRIJA ALLOYS & POWER LTD,A.P.	SM200	2	Mr. Adarsh	9866331188	July,2013	PM10,PM2.5
107	VICAT SAGAR CEMENT LTD,Karnataka	SM200	2	Mr. Sunil Kusture	9663786281	August,2013	PM10,PM2.5
108	DR. REDDY LAB-SEZ- SRIKAKULAM,A.P.	SM200	2	Mr. M. Srinavas Raju.	7702001939	September,2013	PM10,PM2.5
109	MUKAND LIMITED,Karnataka	SM200	2	Mr.Krishna.	9448285901	September,2013	PM10,PM2.5
110	OIL INDIA LIMITED,A.P.	SM200	2	Mr.M.M.Samal.	9493177023	September,2013	PM10,PM2.5
111	SIMHAPURI ENERGY LTD,A.P.	SM200	4	Mr. Venkateshwariu	8008700109	September,2013	PM10,PM2.5
112	FACOR ALLOYS LTD,A.P.	SM200	2	Mr.Gopal Raju.	9494525907	November,2013	PM10,PM2.5
113	ESSAR STEELS- VIZAG,A.P.	SM200	2	Mr. Satya Prasad.	9885188011	February,2014	PM10,PM2.5
114	KAMINENI STEEL & POWER INDIA PVT LTD	SM200	2			June,2014	PM10,PM2.5
115	MEENAKSHI ENERGY PVT LTD , NELLORE,A.P.	SM200	6	Mr.Madhusudan	9985708181	November,2014	PM10,PM2.5
116	MUKAND LIMITED	SM200	2	Mr. Krishna	8904763004	December,2014	PM10,PM2.5
117	KALYANI STEELS LIMITED	SM200	2	Mr. Krishna	8904763004	December,2014	PM10,PM2.5
118	ADANI GROUP	SM200	2	Mr.Mahesh	8980016144	January,2015	PM10,PM2.5
119	EMMAMI PAPER LIMITED	SM200	4	Mr.M.M.Samal	8763949764	January,2015	PM10,PM2.5
120	THANE MUNICIPAL CORPORATION	SM200	1	Mrs.Pradhan	9920401576	March,2015	PM10
121	IFFCO,KANDLA	SM200	2	Mr.BJ JOSHI	9408244673	March,2015	PM10,PM2.5
122	TAMILNADU AGRICULTURAL UNIVERSITY	SM200	1	Mr.Balasubramanian	9443505845	March,2015	PM2.5
123	PIONEER GAS POWER LIMITED	SM200	1	Mr.V.N.S.S.R.T. Prasad	040-23542895	July,2015	PM10,PM2.5

124	TAMILNADU NEWSPRINT AND PAPERS LTD	SM200	1	Mr.Subramaniam,Chief Manager--Env	04324277016	August,2015	PM10,PM2.5
WEB LOGGER FOR COMMUNICATION & DATA CONNECTIVITY : Reference list in India							
125	ADITYA BIRLA CHEMICALS,JHARKHAND	Weblogger WT256	1	Mr.K.N.Mishra	9431527613	April,2014	WT256 for Data Communication
126	ADITYA BIRLA CHEMICALS,JHARKHAND	Weblogger WT256	1	Mr.K.N.Mishra	9431527613	April,2014	WT256 for Data Communication
127	SRF Limited,Dahej, Gujarat	Weblogger WT256	1	Mr.Jagdish Pranami	9737040382	September,2014	WT256 for Data Communication
128	NATIONAL ALUMINUM CO- CPP-ANGUL	Weblogger WT256	1	Mr.N R Mohanty	9437055607	November,2014	WT256 for Data Communication
129	SPIC, TUTICORIN	Weblogger WT256	1	Mr.Prem Anand Raj	0461-2355599	November,2014	WT256 for Data Communication
130	Pidilite Industries,Vapi,Gujarat	Weblogger WT256	1	Mr.Abhijeet	9768957699	November,2014	WT256 for Data Communication
131	MAITHAN ISPAT LTD	Weblogger WT256	2	Mr.Saswat	9437018037	December,2014	WT256 for Data Communication
132	CHEMFAB ALKALIES LTD	Weblogger WT256	1	Mr.Jeyachander	9489648402	December,2014	WT256 for Data Communication
133	CHEMFAB ALKALIES LTD	Weblogger WT256	1	Mr.Jeyachander	9489648402	December,2014	WT256 for Data Communication
134	NATIONAL ALUMINUM CO. LTD- CPP-ANGUL	Weblogger WT256	2	Mr.N R Mohanty	9437055607	January,2015	WT256 for Data Communication
135	STERLITE INDUSTRIES,TUTICORIN	Weblogger WT256	1	Mr.Ramesh Ganesh	8220054142	January,2015	WT256 for Data Communication
136	EMMAMI PAPER LIMITED	Weblogger WT256	2	Mr.M.M.Samal	8763949764	January,2015	WT256 for Data Communication
137	SYNGENTA GOA	Weblogger WT256	2	Mr.Naveen	8323049283	February,2015	WT256 for Data Communication
138	MONNET ISPAT & ENERGY LIMITED	Weblogger WT256	2	Mr.Sunil Khushuwa	9993718955	March,2015	WT256 for Data Communication
139	NATIONAL ALUMINUM CO. LTD-CPP-ANGUL	Weblogger WT256	1	Mr.N R Mohanty	9437055607	March,2015	WT256 for Data Communication
140	IFFCO-KANDLA	Weblogger WT256	1	Mr.BJ JOSHI	9408244673	March,2015	WT256 for Data Communication
141	ACC- WADI	Weblogger WT256	3	Mr.Satyanarayana	9480686389	April,2015	WT256 for Data Communication
142	BIRLA CEMENT-CHITORGARH	Weblogger WT256	5	Mr.M.M.Sheikh	9414396786	April,2015	WT256 for Data Communication
143	BASF	Weblogger WT256	1	Mr.Nishant	9687679747	April,2015	WT256 for Data Communication
144	AARATI INDUSTRIES LIMITED	Weblogger WT256	1	Mr.Vinod patil	9727782288	May,2015	WT256 for Data Communication
145	ADITYA BIRLA CHEMICALS,JHARKHAND	Weblogger WT256	1	Mr.K.N.Mishra	9431527613	October,2012	WT256 for Data Communication
146	WEST COAST PAPER MILLS LTD,Karnataka	Weblogger WT256	4	Mr.A.K.Naithani.	9916910546	December,2012	WT256 for Data Communication
147	SHRI GIRIJA ALLOYS & POWER LTD,A.P.	Weblogger WT256	1	Mr. Adarsh	9866331188	July,2013	WT256 for Data Communication
148	VICAT SAGAR CEMENT LTD,Karnataka	Weblogger WT256	1	Mr. Sunil Kusture	9663786281	August,2013	WT256 for Data Communication
149	DR. REDDY LAB-SEZ- SRIKAKULAM,A.P.	Weblogger WT256	1	Mr. M. Srinavas Raju.	7702001939	September,2013	WT256 for Data Communication
150	MUKAND LIMITED,Karnataka	Weblogger WT256	1	Mr.Krishna.	9448285901	September,2013	WT256 for Data Communication
151	OIL INDIA LIMITED,A.P.	Weblogger WT256	1	Mr.M.M.Samal.	9493177023	September,2013	WT256 for Data Communication
152	SIMHAPURI ENERGY LTD,A.P.	Weblogger WT256	1	Mr. Venkateshwarlu	8008700109	September,2013	WT256 for Data Communication
153	ESSAR STEELS- VIZAG,A.P.	Weblogger WT256	1	Mr. Satya Prasad.	9885188011	February,2014	WT256 for Data Communication
154	KAMINENI STEEL & POWER INDIA PVT LTD	Weblogger WT256	1			June,2014	WT256 for Data Communication
155	MEENAKSHI ENERGY PVT LTD , NELLORE,A.P.	Weblogger WT256	2	Mr.Madhusudan Rao	9985708181	November,2014	WT256 for Data Communication
156	MUKAND LIMITED	Weblogger WT256	1	Mr. Krishna	8904763004	December,2014	WT256 for Data Communication
157	KALYANI STEELS LIMITED	Weblogger WT256	1	Mr. Krishna	8904763004	December,2014	WT256 for Data Communication
158	STAR CEMENT	Weblogger WT256	1	Mr.Rout	8974010164	January,2015	WT256 for Data Communication
159	ADANI GROUP	Weblogger WT256	1	Mr.Mahesh	8980016144	January,2015	WT256 for Data Communication
160	EMMAMI PAPER LIMITED	Weblogger WT256	2	Mr.M.M.Samal	8763949764	January,2015	WT256 for Data Communication
161	THANE MUNICIPAL CORPORATION	Weblogger WT256	1	Mrs.Pradhan	9920401576	March,2015	WT256 for Data Communication
162	IFFCO,KANDLA	Weblogger WT256	1	Mr.BJ JOSHI	9408244673	March,2015	WT256 for Data Communication
163	TAMILNADU AGRICULTURAL UNIVERSITY	Weblogger WT256	1	Mr.Balasubramanian	9443505845	March,2015	WT256 for Data Communication
164	SRI KALAHASTI PIPES LTD	Weblogger WT256	1	Mr.Jothi	9849635316	August,2015	WT256 for Data Communication
165	PIONEER GAS POWER LIMITED	Weblogger WT256	1	Mr.V.N.S.S.R.T. Prasad	040-23542895	July,2015	WT256 for Data Communication
166	TAMILNADU NEWSPRINT AND PAPERS LTD	Weblogger WT256	1	Mr.Subramaniam,Chief Manager--Env	04324277016	August,2015	WT256 for Data Communication

EXTRACTIVE AMBIENT CO ANALYSER : Reference list in India							
167	Extractive CO Analyser	CO Analyser	10				EXTRACTIVE CO ANALYSER FOR AMBIENT
ZIRCONIA OXYGEN ANALYSER, DILUTION EXTRACTIVE ANALYSER Reference list in India							
Sr.No.	Reference Customer list	Process (Stack)Gas	Qty	Contact Person	Contact Details.	In India Installation Since	Parameters Monitored
168	BRILA TYRES,BLSR,ORISSA	ZIRCONIA O2 ANALYSER	4	Mr.Debasis	9861197398	2002	O2
169	VIZAG STEEL PLANTS PROJECT-1	Dilution Extractive Analyser for SO2,NOX	16	Mr.Praveen Minz	8500669492	2005	SO2,NOX (Stack)
170	VIZAG STEEL PLANTS PROJECT-2	Dilution Extractive Analyser for SO2,NOX	16	Mr.Praveen Minz	8500669492	2006	SO2,NOX (Stack)
171	VIZAG STEEL PLANTS PROJECT-2	DATA LOGGERS DL256	20	Mr.Praveen Minz	8500669492	2006	DATA LOGGER
172	ITC, BANGALORE	ZIRCONIA O2 ANALYSER	1			2006	O2
173	BRILA TYRES,BLSR,ORISSA	ZIRCONIA O2 ANALYSER	1	Mr.Debasis	9861197398	2007	O2
174	CEETHAR VESSELS	ZIRCONIA O2 ANALYSER	2			2007	O2
175	WEST COAST PAPER MILL	H2S ANALYSER	2	Mr.A.K.Naithani.	9916910546	December,2012	H2S (Ambient)
176	ASSOCIATED INDUSTRIAL FURNACES (P) LTD	ZIRCONIA O2 ANALYSER	4			2014	O2
	TOTAL NO. OF ANALYSERS		341				

OPSIS®

PERFORMANCE LETTERS

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 Opsis AB in Sweden through their Indian distributors M/s Nevco Engineers Pvt Ltd. in April 2009. The system continuously measures SO2 , NO2 , O3 , 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 dispaly 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 maintanence and 100% data capture time is being acheived.

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 : Opp. NAVAL DOCK YARD, POST BOX NO. 1401, VISAKHAPATNAM - 530 014
Phones : (0891) 2891500, Fax : 2577751, Grams : PETROCHEM, E-mail : info.vskp@andhrapetrochemicals.com
REGD. OFFICE : VENKATARAYAPURAM, TANUKU - 534 215, W. G. DIST., A.P. INDIA.

CONSORZIO DI SVILUPPO INDUSTRIALE
DELLA VALLE DEL BIFERNO
Zona Industriale
86039 TERMOLI (CB)
(tel. 08757591 – telefax 0875759210)

Laboratorio Ambientale

Termoli, 28 March, 2003

Protocol No.: 1593

Sartec Saras Tecnologie s.r.l.
Via G.B. Vico, 38
20123 Milano

SUBJECT: REFERENCE LETTER

We hereby confirm that the company Rancon Instruments S.p.a. from Milan has supplied (order no. 1357) a DOAS OPSIS network for the measurement of the following components:

- SO_2
- NO_2
- Ozone
- Benzene
- Toluene
- NO
- NH_3
- Cl_2
- P-xylene
- Styrene
- CS_2
- Formaldehyde
- Acetaldehyde
- Phenol
- HCl
- HF
- Hg^0
- O-m-p Cresol

OPSIS

MINISTRY OF ENVIRONMENT AND WATER

EXECUTIVE ENVIRONMENT AGENCY

Date :
December 6, 2006

TO WHOM IT MAY CONCERN

Regarding :
Satisfactory Performance of Opsis AQM system

This is to confirm , that we have 5 numbers of Opsis ambient air quality monitoring systems installed in Rousse , Bulgaria, since 1998 , monitoring gas compounds such as SO2,NO2,O3,NO,Phenol,Styrene and Chlorine. The systems are primarily used to monitor ambient air quality in and around industrial areas.

We are satisfied with the performance of the systems, and confirm that the systems has shown to be reliable and working to our satisfaction.

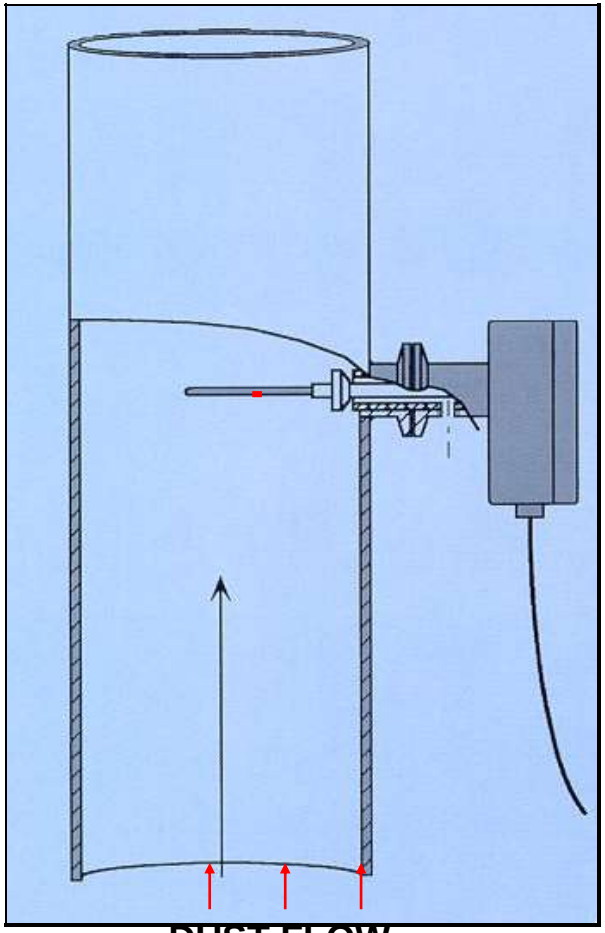
D Vergiev

Signature:

Director
Executive Environmental Agency
Phone : +359 2 9559011
Fax : + 359 2 9559015

STACK SPM ANALYSER

PHENOMENON



- When particles impact the sensor probe or pass nearby, they transfer their charge to the metal probe
- The charge is measured and amplified and converted to mA signal
- The mA signal output correlates to the mass flow of solid particles

S305 – Stack Monitor

- Automatic range set up
- Automatic drift compensation
- Linear monitor for stack monitoring
- Used when calibration to mg/m3 required
- Remote configuration using RS485
- Remote data collection (RS422)
- Self Zero Check
- Self Span Check

SM 200

WATER QUALITY MONITORING

April 10, 2015

OPSIS

WTW

a xylem brand

WTW Solutions for Online Effluent Quality Monitoring..

S SEKHAR SAHOO (GENERAL MANAGER)

Waste Water Monitoring and Control

- pH
- D.O.
- ORP
- NO3
- NO2
- PO4
- TP
- COD
- TOC
- BOD
- NH4
- TDS
- SS
- Tur
- Flow
- Level

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THILLAI GANGA NAGAR
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