Malé Declaration on Control & Its Likely Trans boundary Effects for the South Asia

9th Regional Refresher Workshop

A Capacity Building Program For the National Implementing Agencies

Organizers: CPCB & RRC.AP

December 10-12, 2012

WELCOME DELEGATES & COUNTRY REPRESENTATVES

COUNTRY PRESENTATION BY CENTRAL POLLUTION CONTROL BOARD, DELHI

WWW.NIC.IN

Air Pollution Prevention, Monitoring & Implementation of Activities in India

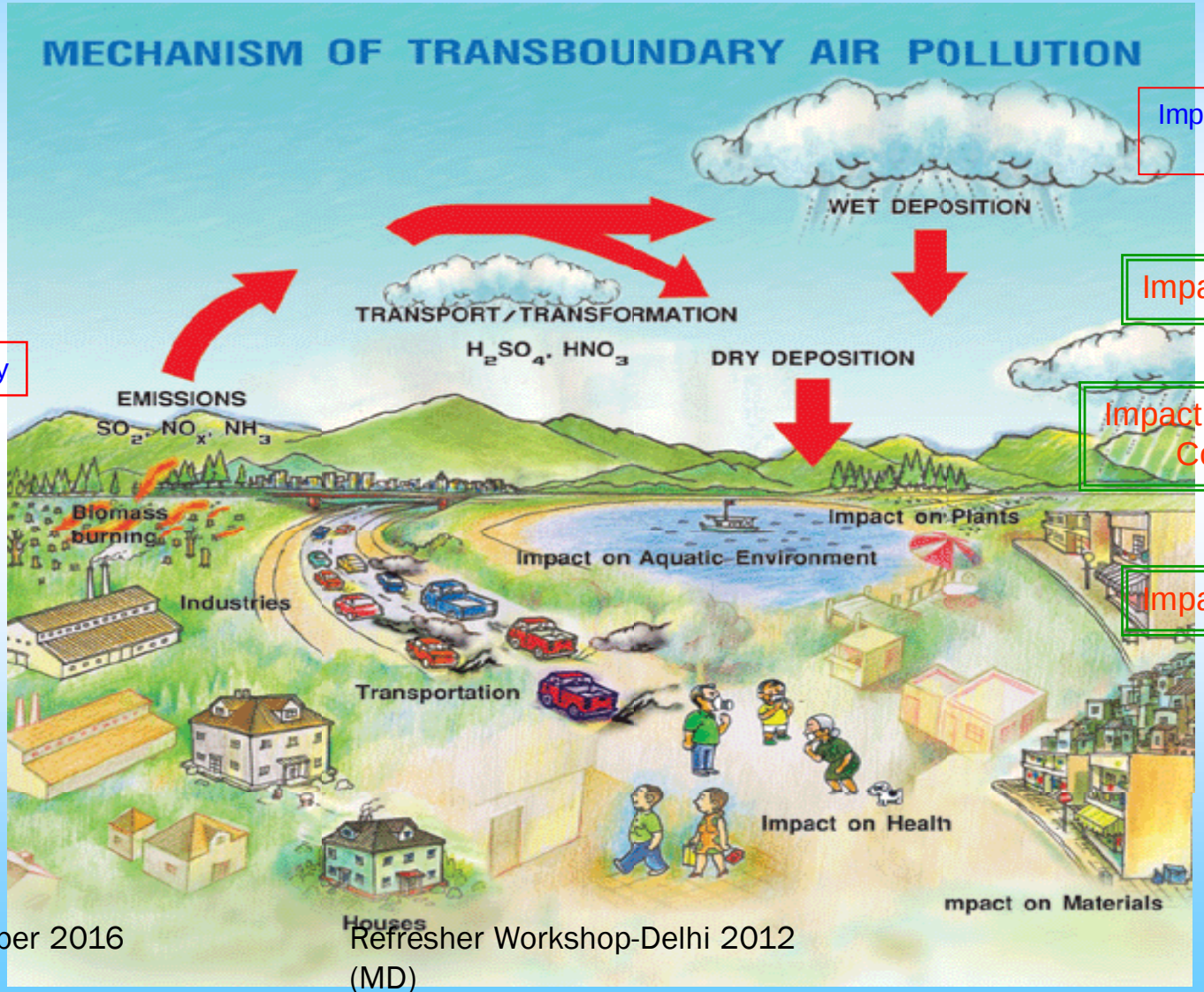
National Implementation Agency: Central Pollution Control Board
National Focal Point: Ministry of Environment & Forests, Govt. of India

PREVENTION & CONTROL OF TRANS-BOUNDARY AIR POLLUTION

Modeling

Emission Inventory

Monitoring



Impact Assessment Studies

Impact on Crops

Impact on Materials Corrosion

Impact on Health

Components of the Declaration:

1. Coordination & Cooperation
2. Emission Inventory
    1. Industrial
    2. Domestic
    3. Line Sources
    4. Fugitive etc.
3. Pollution Prevention
    1. Emission Standards
    2. Source Apportionment etc.
4. Pollution Monitoring
    1. Source emission
    2. Ambient (routine & special)
5. Impact Assessment Studies
    1. Impact on Crop / Food Security
    2. Impact on Materials (Materials Security)
6. Modeling & Evaluation
7. Awareness
8. Capacity Building & Sustainability

Presentation-Agenda

Implementation during Phase IV

(last 4 years: 2009-12)

- Details of National Implementing Agency and Institutional Arrangement
- Details of Monitoring Activities
- Details of Stake-holders participation
- Data Completeness
- Status of emission inventory and modeling
- Status of impact assessment
- Challenges and difficulties

Institutional Arrangement India

National Focal Point:

Ministry of Environment and Forests

Government of India

National Implementing Agency

Central Pollution Control Board

Implementation Status (Phase-IV)

S. No.	Activity	Summary Status
1	Ambient Air Quality Monitoring and wet deposition monitoring	▪ Ambient air quality monitoring and wet deposition monitoring is being carried out at Sunderban bordering Kolkata. ▪ Discussions initiated with concerned SPCBs/PCCs to set up monitoring stations in other bordering areas. ▪ 6 Transboundary Monitoring are in operation
2	Corrosion Study	▪ Corrosion study has been completed at TajMahal, Agra ▪ Awarded one project to National Metallurgical Laboratory at Jamshedpur for carrying impact on materials at 9 cities in India including one virgin area
3	Health Impact Study	▪ Two studies completed through Chittaranjan National Cancer Institute (CNCI), Kolkata. ▪ Impact on Benzene exposure on Petrol pump workers has been initiated ▪ Development of Protocol Monitoring & Instrumentation is in progress.
4	Crop Impact Study	▪ We have intimated approved list Research Institute to Male Secretariat ▪ Male Secretariat is dealing this particularly activity
5	Emission Inventory	▪ Completed National Emission Inventory in 2009 and the is being regularly up-dated.
6	Advisory committee	▪ Advisory committee is being revised
7	Awareness	▪ CPCB is maintaining a very dynamic website along with list of publications, soft copy of almost all documents, online air quality data, data of Environmental Data Bank including Trans-boundary ambient air quality stations.
8	Other activities	▪ Trajectory analysis of Sunderban stations is proposed for Sunderbans Ambient Air Quality Monitoring Station.

Additional Activities (Routine)

- **Source Apportionment study in six cities**
- **Emission inventory in six cities & initiation for other cities**
- **Emission factors for vehicles and Implementation Euro Norms**
- **Source profile for vehicular sources**
- **Source profiles for non-vehicular sources**
- **Routinely done: Development of Emission Standards & Revision of Standards**
- **Introduction of IS 17025/IS 9000 & OHSAS for all Environmental Laboratories**
- **Initiation for Pilot Project on Emission Trading Scheme for Particulate in Stationary Sources (Stack)**

Additional Activities (1)

- **Organization of various programs for the successful Implantation of the Declaration. Some of them are as under:**
  - Regional Refresher Courses / workshops): organized 5 (including the present one), out of total 9;
  - Stake-holders meeting 3, out of total 6;
  - Inter-governmental meetings 3, out of 12;
  - Capacity building programs on Health Impact Assessment, Emission Inventory, crop Impact Assessment etc.)
  - Series of Hands on Training programs, refresher courses, workshops for dry & wet deposition towards uniformity in sampling and data generation, etc.
  - Participation Task Force Committee

- **The Present program has the following focus:**
  - To strengthen the monitoring capacity.
  - To share and discuss the issue encountered in operating the monitoring station in each country.
  - To update the implementation activities under Male' Declaration in each country

Additional Activities (2)

- **Revision of National Ambient Air Quality Standard (November 2009)**
  - **Uniform ambient air quality for all**
  - **Special monitoring for Ecologically sensitive areas**
  - **Consideration of health related parameters viz. PM2.5, Benzene, Bezo(a)Pyrene.**
  - **Consideration of Signature metal analyses like Nickel, Arsenic and lead**
  - **537 ambient air quality stations are in operation. The data generated in these stations are regularly analyzed for Trend Analyses, special attention area, problem area**

- **Preparation of Criteria for Comprehensive Environmental Assessment for Industrial Clusters**
  - **Rational to characterize the environmental quality at a given location by means of algorithm of source, pathway and receptor.**

- **Regional Cooperation**
  - **Signed MoU with Royal Government of Bhutan & CPCB for capacity building, demonstration & training (completed six years)**

Additional Activities (4)

- Development of Regional Centres in India and in other countries
  - Associated with the activity for development of Standard format and questionnaires, feedback and evaluation / assessment.
- Recognition of Laboratories for Regional Centres in India
  - The laboratories of CPCB are being up-graded and modernized to undertake the activities for Monitoring & measurement of pollutants (e.g. emission, effluent, ambient besides special pollutants besides 'Dry & Wet Deposition' studies)
  - Taking up the impact of Air Pollution on Metals & non-metals by another Regional Centre known as National Metallurgical Laboratory (CSIR-Jamshedpur)

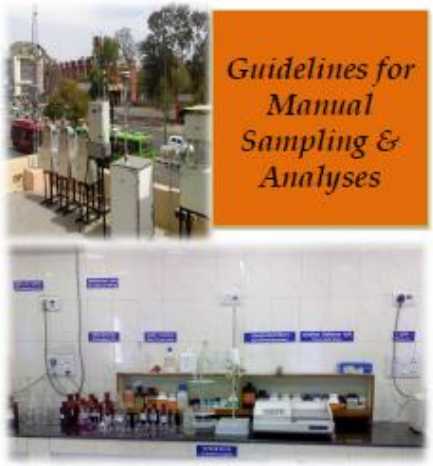
NATIONAL AMBIENT AIR QUALITY STANDARDS (2009)

Pollutants	Time Weighted Average	Concentration in Ambient Air		Methods of Measurement
		Industrial, Residential, Rural and other Areas	Ecologically Sensitive Area (Notified by Central Government)	
Sulphur Dioxide (SO_2), µg/m^3	Annual * 24 Hours **	50 80	20 80	-Improved West and Gaeke Method -Ultraviolet Fluorescence
Nitrogen Dioxide (NO_2), µg/m^3	Annual * 24 Hours **	40 80	30 80	-Jacob & Hochheiser modified ($NaOH$-$NaAsO_2$) Method -Gas Phase Chemiluminescence
Particulate Matter (Size less than 10µm) or PM_{10}, µg/m^3	Annual * 24 Hours **	60 100	60 100	-Gravimetric -TEOM -Beta attenuation
Particulate Matter (Size less than 2.5µm) or $PM_{2.5}$, µg/m^3	Annual * 24 Hours **	40 60	40 60	-Gravimetric -TEOM -Beta attenuation
Ozone (O_3) µg/m^3	8 Hours * 1 Hour **	100 180	100 180	-UV Photometric -Chemiluminescence -Chemical Method
Lead (Pb) µg/m^3	Annual * 24 Hours **	0.50 1.0	0.50 1.0	-AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper -ED-XRF using Teflon filter
Carbon Monoxide (CO), mg/m^3	8 Hours ** 1 Hour **	02 04	02 04	-Non dispersive Infrared (NDIR) Spectroscopy
Ammonia (NH_3), µg/m^3	Annual * 24 Hours **	100 400	100 400	-Chemiluminescence -Indophenol blue method
Benzene (C_6H_6), µg/m^3	Annual *	05	05	-Gas Chromatography (GC) based continuous analyzer -Adsorption and desorption followed by GC analysis
Benzo(a)Pyrene (BaP) Particulate phase only, ng/m^3	Annual *	01	01	-Solvent extraction followed by HPLC/GC analysis
Arsenic (As), ng/m^3	Annual *	06	06	-AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper
Nickel (Ni), ng/m^3	Annual *	20	20	-AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper

Review of the National Ambient Air Quality Guidelines

Guidelines for the Measurement of Ambient Air Pollutants

VOLUME-I



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May, 2011

Guidelines for the Measurement of Ambient Air Pollutants

VOLUME-II

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National Ambient Air Quality Monitoring Program

National Ambient Air Quality Standard Parameters

Manual Monitoring

SO_2, NO_2, PM_{10}, $PM_{2.5}$, O_3, NH_3, Benzene, BaP, Ni, As, Pb

Gravimetric

PM10 & PM2.5

Wet-chemical Methods

SO_2, NO_2, O_3, NH_3, Benzene

Sample Processing & Chemical Analyses

Benzene, B(a)P, Ni, As, Pb (in PM10)

Well established monitoring -cum-laboratory infrastructure, Trained man-power, Well established guidelines, manual data generation & dissemination etc.

Automatic Analyzers

SO2, NO2, PM10, PM2.5, O3, CO, NH3, Benzene

Sophisticated Analyzers, QA/QC, Instant Data Generation, On line data disseminations, Air Quality Index, Early Warning System, Forecasting, Modeling etc.

Site & Parameter Selection

Background & other areas(Rural, Semi-urban, Urban, Industrial, sensitive etc.)

Site Selection

- Away from source & other interferences [Inlet 15 m away from source / traffic artery]
- Height of inlet >3m [preferably 3-10m] Double the height of nearby wall / obstructed
- Free flowing, well mixed
- Elevation Angle <30 [from inlet to top of building]
- Collocated samplers should be 2 m apart

Parameter Selection

- Sensitive Location (SO2 & NO2)
- Health Impact Stations (All pollutants)
- Population & Exposure (All Criteria Pollutants)
- Kerb side [Traffic Intersection] (Criteria Pollutants + CO)
- Downtown [Accumulative, 50 m away traffic intersection] (Criteria Pollutants + O3)

National Ambient Air Quality Monitoring Program

National Ambient Air Quality Standard Parameters & Methods

Manual: SO2, NO2, PM10, PM2.5, O3, NH3, Benzene, Ni, As, Pb, B(a)P

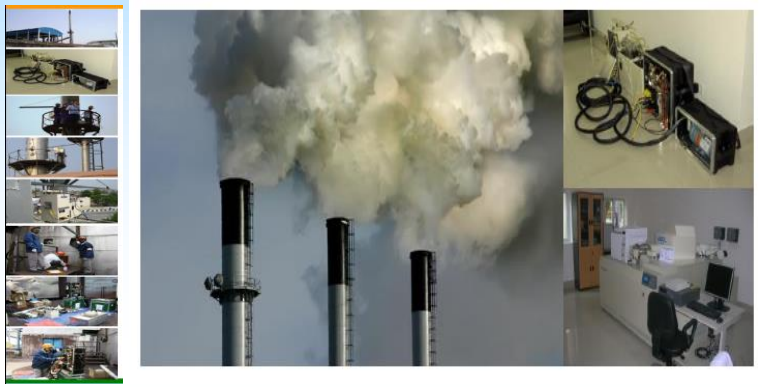
Automatic : SO2, NO2, PM10, PM2.5, O3, CO, NH3, Benzene

Manual	Parameters	Automatic
Improved West & Geake Method	SO_2	Ultra-violet Fluorescence
Modified Jacob & Honchheiser Method	NO_2	Chemiluminescence
Chemical (Buffered KI) Method	O_3	UV-Photometric , Chemiluminescence
Indo-phenol Blue Method	NH_3	Chemiluminescence
	CO	Non-dispersive Infrared Spectroscopy
Gravimetric Method	$PM_{2.5}$	TEOM, Beta Attenuation
Adsorption -desorption followed by GC	Benzene	GC Based Continuous Analyzer
Gravimetric Method	PM_{10}	TEOM, Beta Attenuation
AAS / ICP after sampling using EPM 2000 ED-XRF using Teflon filter	Ni, Pb	
AAS / ICP after sampling using EPM 2000	As	
Solvent Extraction followed by HPLC / GC Analyses	B(a)P	

Source Monitoring

CPCB Series / LATS/…… / 2012-13

Guidelines on Methodologies for Source Emission Monitoring



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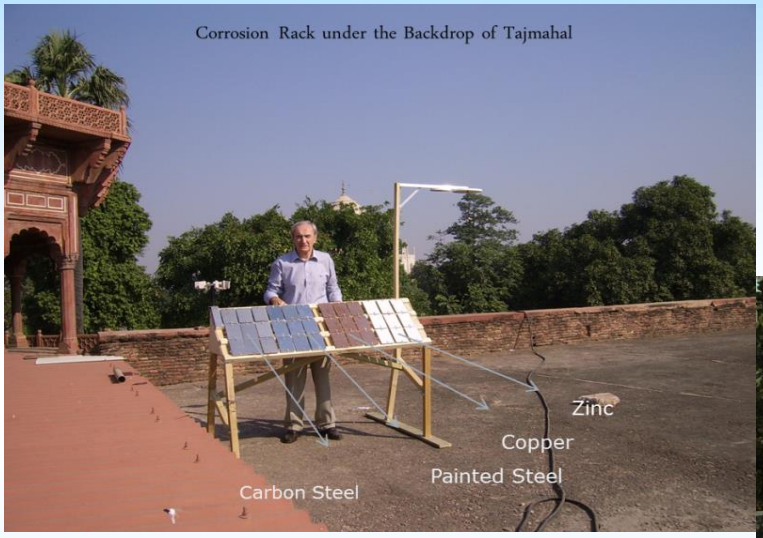
Corrosion Studies



METHODOLOGY
(Corrosion Investigation)

•Exposure of the specimens of the appropriate sizes as per ASTM specification . G50-76 at the chosen sites, on the steel racks installed at appropriate places.

•The corrosion i.e. the deterioration of the materials is affected by (1) rain fall, (2) temperature, (3) salinity, (4) acidic gases and humidity surrounding the area besides collection of meteorological data for all selected location.

•Similarly dust collectors will be installed at different locations to collect the data for:

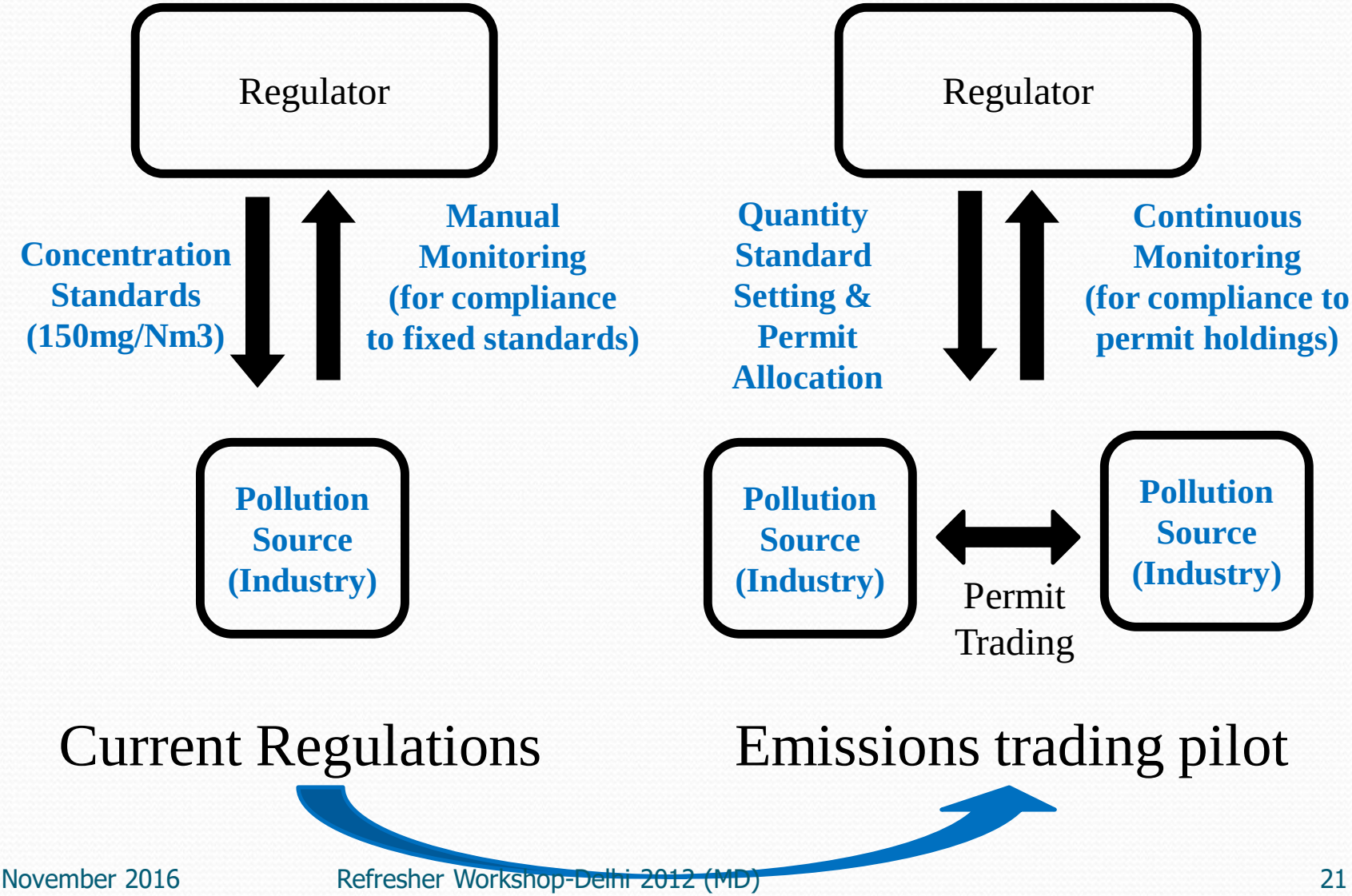
a) Falling of dust per unit area
b) Presence of heavy metals
c) Analysis of components in dust
d) pH of dust

•Finally the evaluation of the corrosion products formed on different samples exposed at various locations using various analytical techniques such as: XRD, Raman Spectroscopy, Scanning electron microscopy, X-ray photoelectron spectroscopy, etc. ; study the kinetics and mechanism of the degradation of materials.

Impact of air pollution in India on deterioration of metals and materials

Material	Corrosion rate (µm/year)			
	Locations			
	Jamshedpur	New Delhi	Lucknow	Mumbai
Weathering steel	24.96	18.57	11.68	26.19
Brass	1.07	4.19	1.40	3.76
Bronze	2.91	3.32	1.22	3.80
Copper	3.40	4.35	2.56	4.58
Aluminium	0	1.28	0	0.38
Zinc	1.53	1.70	-	2.62

Market-based Scheme Reduces Compliance Cost by Giving Industry More Flexibility in Abatement



Phases of Pilot ETS

- **Design Phase (Phase-I)**
  - Understanding the activity
  - Identification of project sites,
  - CEMS draft standards,
  - Data Transmission standards,
  - Training and workshops
  - Synchronization
- **Baseline Survey (Phase-II)**
  - Baseline survey of industry and associated research
  - Care Center setup in SPCBs and CPCB
  - CEMs installation in industry and connection to CARE centers
  - ETS Implementation Phase
- **Implementation Phase (Phase-III)**
  - Implementation of pilot emissions trading regime and associated evaluation

Challenges Anticipated in ETS

- **Installation of CEMs**
- **Calibration of CEMS**
- **Calibration Facilities**
- **In-house calibration facilities**
- **Development of SOPs**
- **Training**

- **Data Generation**
- **Data Validation**
- **Data Transfer**
- **Data Storage**
- **Data Evaluation**
- **Development of SOPs**
- **Training**

- **Specification of CEMS, supply of CEMS, local maintenance**
- **Development of load based Emission Standard**
- **Legal backup**
- **Participation and Synchronization**

Trans-boundary Ambient Air Quality Monitoring

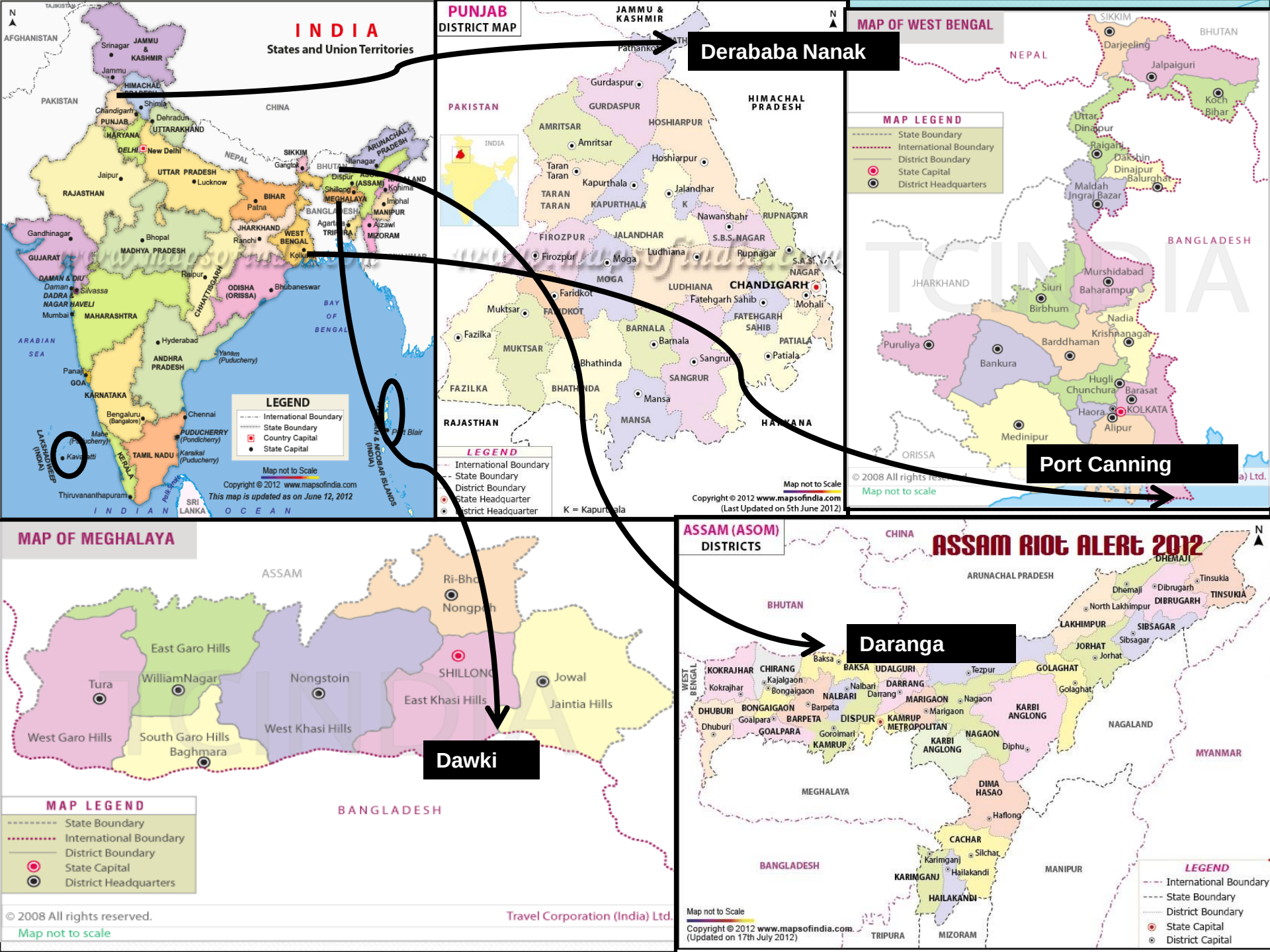
Establishment & operation of Trans-boundary Ambient monitoring stations, viz.;

1. Port Canning-West Bengal (India & Bangladesh);
2. Dera Baba Nanak ,Pathankot-Punjab (India & Pakistan);
3. Lakshadweep (India & Maldives);
4. Daranga-Assam (India & Bhutan) and
5. Dawki-Meghalaya (India & Bangladesh)
6. Andaman & Nicobar

Status of ambient air quality monitoring stations in Male' Declaration under NAMP

	Monitoring stations at (city)					
	Dawki	Port Canning	/Pathankot	Daranga	Kavaratti	Andaman & Nicobar
State	Meghalaya	West Bengal	Punjab	Assam	Lakshadweep	Andaman & Nicobar Islands
No. of stations	1	1	1	1	2	5
Name of monitoring station	Terrace Building, Dawki, Jaintia Hills District	Port Canning, Sunderban	C-PYTE Building, Dera Baba Nanak	BATAD, Baska district,	Kavaratti	Port Blair, Brookshabd, Rangat, Campbell Bay
Bodering	Bangladesh	Bangladesh	Pakistan	Bhutan	Maldives	South East Asia
Lat & long	26°47´06″ N	22°19´8″ N	32°1´60″ N 75°1´0″	26°48´ N	10° 0´ N 73° 0´	
Sanction date	23.06.2008	2004	23.06.2008	August 2008	10.09.2010	10.09.2010
Operating since	August 2009	2004. Stopped monitoring from December 2011	January 2010	January 2009	Yet to operate	Yet to operate
Monitored by	Meghalaya SPCB	Jadavpur University, Kolkata	Punjab SPCB	Assam SPCB	Lakshadweep PCC	Andaman & Nicobar PCC
Parameters monitores	SO_2, NO_2, PM_{10}, SPM	SO_2, NO_2, PM_{10}, SPM	SO_2, NO_2, PM_{10}, SPM	SO_2, NO_2, PM_{10}, SPM	NA	NA
Status as on date	Data received since September 2009	MOU to be renewed	Data received since January 2010	Data received since January 2009	Yet to operate	Yet to operate

------*Yet to operate*


INDIA
States and Union Territories
PUNJAB
DISTRICT MAP
MAP OF WEST BENGAL
MAP OF MEGHALAYA
ASSAM (ASOM)
DISTRICTS
ASSAM RIOT ALERT 2012
Derababa Nanak
Port Canning
Daranga
Dawki
LEGEND
MAP LEGEND
International Boundary
State Boundary
District Boundary
State Capital
District Headquarters
Map not to Scale
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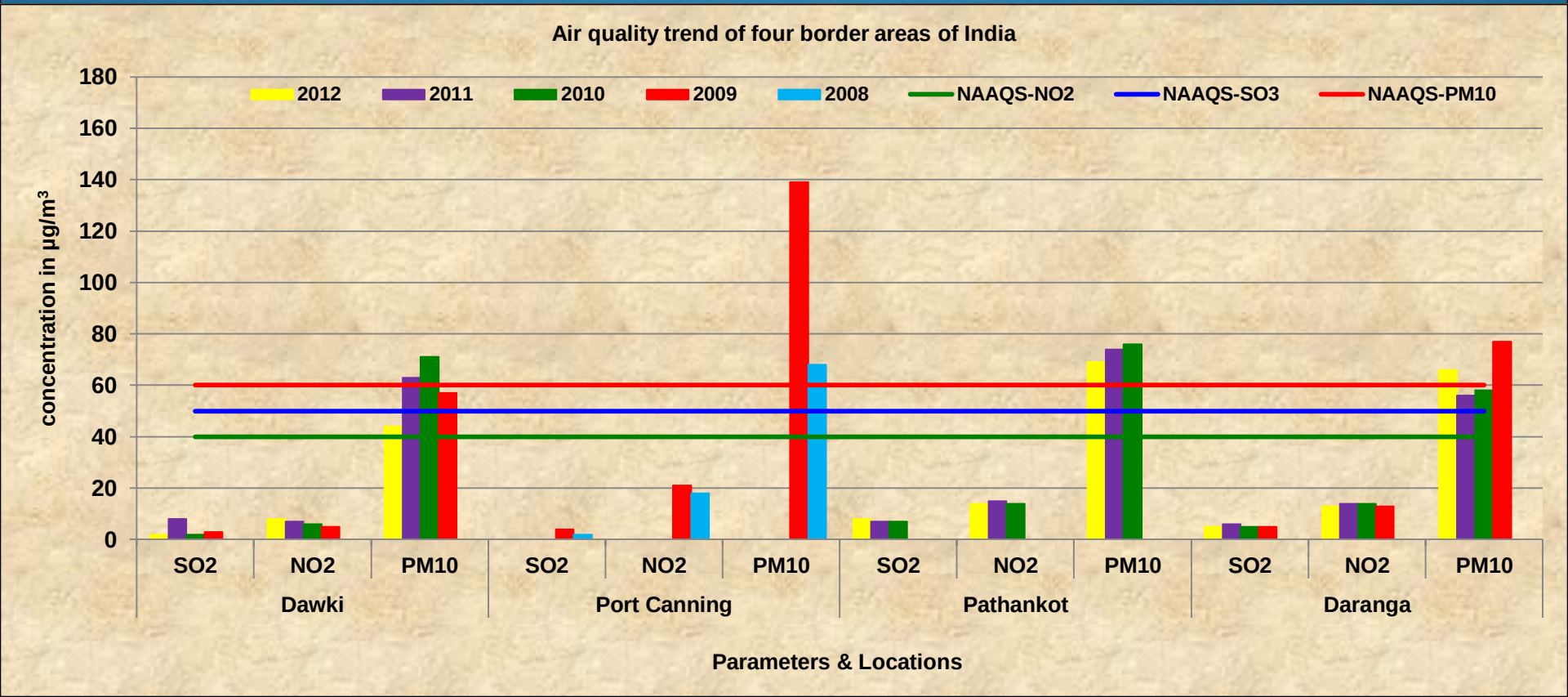
Map not to scale

Status of ambient air quality in Male' Declaration under NAMP

	Monitoring stations											
	Dawki (Bangladesh border)			Port Canning (Bangladesh border)			Pathankot (Pakistan border)			Daranga (Bhutan border)		
	SO_2	NO_2	PM_{10}	SO_2	NO_2	PM_{10}	SO_2	NO_2	PM_{10}	SO_2	NO_2	PM_{10}
2012	2	8	44	-	-	-	8	14	69	5	13	66
2011	8	7	63	-	-	-	7	15	74	6	14	56
2010	2	6	71	-	-	-	7	14	76	5	14	58
2009	3	5	57	4	21	139	-	-	-	5	13	77
2008	-	-	-	2	18	68	-	-	-	-	-	-

NB. Port Canning-Jan & Feb data 2009; Daranga-Jan-Feb 2012; Dawki-Jan-Oct data 2012; all values are in microgram per meter cube



Thank you all