



# Air quality monitoring network in Hong Kong

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## HKEPD's Air Quality Monitoring Network

- HKEPD operates a network of fifteen (15) Air Quality Monitoring Stations. 12 stations for monitoring general (ambient) air quality and 3 stations for roadside air quality.
- Another new general station will be established by 2015
- Eight major air pollutants measured (NO<sub>2</sub>, CO, O<sub>3</sub>, SO<sub>2</sub>, PM<sub>10</sub>, PM<sub>2.5</sub>, TSP and Lead)

## Locations of Existing HKEPD's Air Quality Monitoring Stations (AQMS)



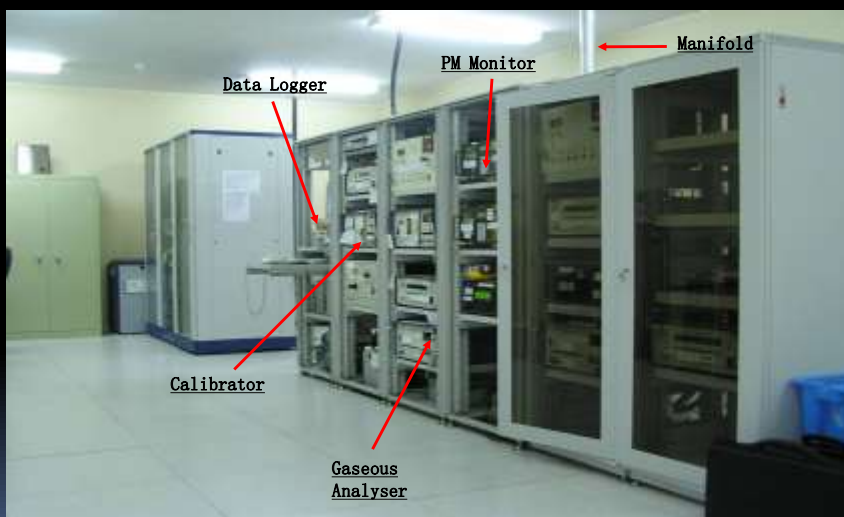
## Main Objectives

- understand air pollution problems in order to develop cost-effective policies and solutions;
- assess the extent of compliance or otherwise with the standards and targets;
- assist the assessment of public's exposure to air pollution; and
- provide the public with information on current and forecasted air quality

## A typical general AQMS



## Setup inside a typical general AQMS



## New general AQMS at Tuen Mun



## Roadside Air Quality Monitoring Station (Central)

- Microscale Monitoring station
- To assess the impact of vehicular emissions to sensitive users including pedestrians in Central district as well as to determine the roadside air quality in areas of similar conditions





## Background General AQMS (Tap Mun)

- To serve as the background station for tracking impact of regional air pollution
- One of the 3 Hong Kong stations in the PRD Regional Air Quality Monitoring Network



## Air Science Laboratory

### Maintenance & Development

- ☞ *Equipment maintenance*
- ☞ *Testing and calibration*
- ☞ *Handling of filter samples*



### Quality Control & Quality Assurance

- ☞ *To perform quality audits*
- ☞ *To ensure data are highly accurate and precise*



### Data Processing & Management

- ☞ *Handling of data collected*
- ☞ *Releasing of information to the public*





## Other measurements and studies

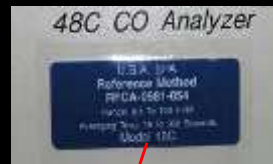
- Toxic Air Pollutants including persistent organic pollutants (POPs) are measured at two general stations
- Acid Rain Samplers in three general stations
- **Saturation Monitoring Studies:** To conduct territory-wide intensive PM<sub>2.5</sub> and nitrogen dioxide (NO<sub>2</sub>) measurement studies covering both ambient and roadside in the coming two years for characterising spatial distribution of air pollution and adequacy of the monitoring network.

## Acid Rain System



## Equipment Selection and Measurement Method

- All equipment used are designated by USEPA
- USEPA reference or equivalent methods are used for monitoring



## Equipment used in measuring air pollutant concentration

<u>Pollutants</u>	<u>Measurement Principle</u>	<u>Commercial Instrument</u>
SO <sub>2</sub>	UV fluorescence	TECO Model 43A, 43I, API 100E
NO/NO <sub>2</sub> /NO <sub>x</sub>	Chemiluminescence	API 200A, Thermo 42I
O <sub>3</sub>	UV absorption	API 400/400A, Thermo 49I
CO	Non-dispersive infra red absorption with gas filter correlation	TECO Model 48C API 300
TSP	Gravimetric	General Metals 2310
PM <sub>10</sub> & PM <sub>2.5</sub>	Gravimetric Oscillating microbalance	Graseby Anderson PM <sub>10</sub> , Partisol 2025 R&P TEOM series 1400-AB, 1405DF
SO <sub>2</sub> , NO <sub>2</sub> , O <sub>3</sub>	Differential Optical Absorption Spectroscopy	Opsis AR 500 System



## Standards of Air Quality Monitoring Network

- ISO17025 accreditation under the Hong Kong Laboratory Accreditation Scheme (HOKLAS)
- ISO9001:2008 standard
- All the monitoring stations were built and operated with reference to USEPA's standards
- Comprehensive QA/QC manuals and Standard Operating Procedures



## Mercury Monitoring in Hong Kong

- Routine monitoring on particulate-bound mercury through the speciation analysis of PM10 and PM2.5 sampled filters by laboratories
- Instrument used:
  - Inductively Coupled Plasma - Mass Spectrometry (ICP-MS)
  - X-ray Fluorescence (XRF) Analyzer

## RSP Speciation Analysis (8" x 10" Filter)



## RSP Speciation Analysis (8" x 10" Filter)

ARIZONA SPECIES CONCENTRATIONS AS DERIVED FROM RESPIRABLE SUSPENDED PARTICULATES FOR 2012

Location	MMF	Al	Si	Ca	Fe	Pb	Cd	Mn	Cu	Zn	As	Se	Hg	Cr	Mo	Ni	Co	Br	K	Na	Mg	S	C	PM10	PM2.5	PM10-2.5	PM2.5-10	PM10-2.5	PM2.5-10
Market Center	17	3.9	0.044	0.74	8.1	1.1	0.1	0.04	1.9	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
Valley Link	68	12	0.04	0.06	1.1	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
Central Phoenix	11	1.1	0.04	0.06	0.1	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
Tempe West	11	1.1	0.04	0.14	0.17	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
West Valley	68	12	0.04	0.14	0.17	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
Tempe East	11	1.1	0.04	0.14	0.17	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
West Mesa	11	1.1	0.04	0.14	0.17	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
Average	36	3.9	0.04	0.17	0.17	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	

Notes: 1. All figures are in micrograms per cubic meter except for PM10-2.5 in micrograms per cubic meter.  
 2. All values presented are annual arithmetic means.  
 3. The concentrations of all species are based on the chemical analysis of samples in suspended particulate matter.  
 4. The 2.5-micrometer diameter size fraction.

Abbreviations:  
 Al - Aluminum  
 As - Arsenic  
 Br - Bromine  
 Ca - Calcium  
 Cd - Cadmium  
 C - Carbon  
 Co - Cobalt  
 Cr - Chromium  
 Cu - Copper  
 Fe - Iron  
 Hg - Mercury  
 K - Potassium  
 Mg - Magnesium  
 Mn - Manganese  
 Mo - Molybdenum  
 Na - Sodium  
 Ni - Nickel  
 Pb - Lead  
 Se - Selenium  
 S - Sulfur  
 Si - Silicon  
 Zn - Zinc



## Further Exploration in Mercury Monitoring

- Keeping in view the methods used for measuring dry and wet mercury deposition
- Waiting for the announcement of protocol/method for mercury monitoring under the Minamata Convention on Mercury
- Seeking information from laboratories/ other monitoring authorities on purchase and upgrade of equipment



END

Thank You