



**Malé Declaration on Control and Prevention of Air Pollution  
and Its Likely Transboundary Effects for South Asia**



**Report of the  
Training Program and refresher course  
On  
Monitoring Transboundary Air pollution**

**13 – 16 March 2006  
UNEP RRC.AP, Thailand**

## **REPORT**

### **TRAINING PROGRAMME AND REFRESHER COURSE**

**13 –16 March 2006, UNEP RRC.AP, Pathumthani, Thailand**

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Proceedings

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## LIST OF ACRONYMS

AAS	Atomic Absorption Spectrophotometer
ABC	Atmospheric Brown Cloud
AIT EE	Asian Institute of Technology Environmental Engineering
AIT	Asian Institute of Technology
AQM	Air Quality Management
CPCB	Central Pollution Control Board
HVS	High Volume Sampler
IVL	IVL Swedish Environmental Research Institute
MISU	Department of Meteorology- Stockholm University
MoC	Monitoring Committee
NIA	National Implementing Agency
Pak- EPA	Pakistan Environmental Protection Agencies
QA/AC	Quality Assurance / Quality Control
SEI	Stockholm Environment Institute
Sida	Swedish International Cooperation Development Agency
SOPs	Standard Operating Procedures
UNEP RRC.AP	United Nations Environment Programme Regional Resource Center for Asia and the Pacific

# REPORT

*The fourth regional training on monitoring transboundary air pollution was held at United Nation Environment Programm Regional Resource Center for Asia and Pacific, Pathumthani, Thailand during 13 – 16 March 2006. The major objective of the training were to introduce the **Quality Control and Quality Assurance (QA/QC) programme**; and to discuss the issues encountered in operating the monitoring sites in each country. This regional training program was to **strengthen the monitoring network based on the common methodologies and standards at the national level and to exchange the experience in developing national monitoring stations**. This is the fourth regional training program under the Malé Declaration on the Control and Prevention of Air Pollution and its Likely Transboundary Effects for South Asia.*

*The training program was attended by laboratory technicians and project managers who are in charge of Malé Monitoring Stations in the participating countries as well as the members of Monitoring Committee (MoC), SEI, IVL, UNEP, and AIT. A list of the participants is enclosed in Attachment 1.*

*The training was organised by UNEP RRC.AP, in collaboration with IVL, SEI and AIT. The training was funded by Sida as a part of the Programme on Atmospheric Environment Issues in Developing Countries.*

## **1. Opening Session**

The training program started with a welcome and opening address by Mr. Mylvakanam Iyngararasan (UNEP RRC.AP). This was followed by the self-introduction of the participants.

## **2. Introduction to training program and Phase III development**

Mr. Mylvakanam Iyngararasan presented a brief on the project objectives; the recent activities which included in-country training in Pakistan, installation of AAS (Atomic Absorption Spectrophotometer) in Bangladesh and development of the Phase III implementation of Malé Declaration; and the objective of the training program. The detail of the presentation is mentioned in Attachment III.

A short video on the monitoring of aerosols in Maldives, using unmanned aircraft was showed to the participants. This was taken during the training under project of ABC (Atmospheric Brown Cloud). It was mentioned that Malé Declaration could provide the political platform later on after receiving the scientific inputs from the impact assessments under project ABC.

### **3. QA/QC programme**

Mr. Sagar Dhara (MoC) discussed the appropriate QA/ QC activities under the project (Attachment IV). The presentation includes QA/QC activities on data quality objectives, site, choice methods, sampling, sample storage, analysis, reporting, and reference laboratory activities. This was followed by a discussion on the various issues faced by the countries in operating the monitoring stations. The major issue discussed were on how data quality can be maintained and the logistical problem.

Ms. Karin Sjoberg from IVL presented QA/QC activities on wet deposition and long range transport of air pollution analysis in Europe. She also presented a comparison between diffusive samplers and active monitoring techniques; and inter-comparisons between different diffusive samplers (attachment Va and Vb). The presentation on QA/QC on wet deposition included QA/QC on wet deposition monitoring site, monitoring method, sampler collection, sampler handling, analysis, reporting and inter-comparison on passive samplers. The presentations were followed by discussions and the problems faced by participants on using passive sampler, wet only collector and bulk collector.

### **4. Passive Sampler Inter-comparison**

Dr. Kevin Hick from SEI presented two options on how the passive sampler inter-comparison study will be done in Malé Declaration countries. The first option is the laboratory in the region registered to analyse IVL passive samplers and the second is to conduct study to find suitable alternative passive sampler that can be produced and analyse in the region. The detailed on the presentation is given in attachment VI.

### **5. Data analysis and reporting**

Mr. Mylvakanam Iyngararasan of UNEP RRC.AP then presented the data report and data analysis. The regional database currently operational at UNEP RRC.AP was also presented to the participants. This was followed by discussions on the problem faced by each country during sampling and analysis of the monitoring data.

### **6. Inter laboratory calibration**

Dr. N. T. Kim Oanh from AIT presented the inter laboratory calibration which included: errors in monitoring; inter-lab comparison as a component of QA/QC; and inter-lab comparison tasks. The presentation included the importance of data quality, the role of the reference laboratory and the importance of QA/QC of the participating laboratories in each country. The detailed presentation is given in attachment VII.

## 7. Laboratory and practical Sessions

Both equipment demonstration and laboratory sessions were held at AIT Environmental Engineering laboratory (AIT EE). Demonstration of monitoring wet only collector was presented to a group of participants by Mr. Tin Win, Laboratory Supervisor in the afternoon on 14 March.



Two laboratory sessions on the morning of 15-16 March were conducted at AIT EE laboratory. The participants were divided into three groups for the lab sessions. The parameters and methods used to determine each of the ions during the training session is provided in table 1.

**Table 1: Parameters analysed and methods used**

<i>Parameter</i>	<i>Method</i>
<b>Hardness of water</b>	Titration method
- Calcium as Calcium Carbonate	
- Magnesium as Magnesium Carbonate	
- Total Hardness (Calcium + Magnesium)	
- Calcium ion (Ca <sup>+2</sup> )	
- Magnesium ion (Mg <sup>+2</sup> )	
<b>Sulphate (SO<sub>4</sub>)</b>	Spectrophotometer

A technical manual describing each of the methods are available as a separate volume.

During the laboratory sessions participants were grouped into three groups and they analysed blind samples for each of the parameters.

Results from each of the group (table 2) were presented at the end of the program and each of the data points were discussed for possible errors and improvements. The results were also interpreted and each of the groups was evaluated for their performance.

**Table 2: Results of analysis**

<b>Parameter</b>	<b>Reference</b>	<b>Group-1</b>	<b>Group-2</b>	<b>Group-3</b>
Total Hardness (mg/L as CaCO <sub>3</sub> )	100.00	94.00	92.00	94.00
Ca Hardness (mg/L as CaCO <sub>3</sub> )	72.00	67.00	64.00	76.00
Ca Hardness (mg/L as Ca <sup>++</sup> )	28.80	26.80	25.60	30.40
Mg Hardness (mg/L as CaCO <sub>3</sub> )	28.00	27.00	28.00	18.00
Mg Hardness (mg/L as Mg <sup>++</sup> )	6.80	6.80	6.80	4.37
Sulfate (mg/L)	19.00*	18.61	18.00	17.81

The computing of R1 and R2 was also presented to the participants by Sagar Dhara.

## **8. Discussion**

The training programme was organised in a participatory manner and extensive discussions were held throughout the training. The discussions and the main challenges faced by each country on monitoring site, monitoring equipment, data reporting and logistics are mentioned below:

### **Bangladesh**

- (i) They were not able to send data regularly in the past, due to the trained person leaving them. Now a new person has come as replacement.
- (ii) It was mentioned that the power supply problem would be fixed within a month or two.
- (iii) Requested to provide three cathode lamps needed for the AAS which were lost during transport.
- (iv) Agreed to provide monthly meteorological data on major wind direction together with average wind speed, precipitation, humidity and temperature from near by Meteorological station.

### **Bhutan**

- (i) Administrative and logical problems like admin approval on expenses for site travel, cost on postal service, etc., in getting samples from the site was mentioned.
- (ii) It was mentioned that passive samplers are good for cross checking to avoid any doubt in data quality.
- (iii) Difficulties in getting spare parts for the High Volume Sampler (HVS) and communication with the vendor were mentioned.
- (iv) Need a new cover for wet only collector, which was broken.

### **Iran**

- (i) Difficulty in getting Nitrate and Ammonia samples
- (ii) Need more than one station
- (iii) Short life of lid and funnel holder.
- (iv) Need two spare funnels due to short life of funnels.

### **Nepal**

- (i) Problems in power supply. Samples in freezers also get affected when power fails. A question was raised on whether preservative need to be used.
- (ii) Delay communication between NIA and the staff at the site on issue like chemicals running out was not notified in time.
- (iii) Due to political disturbances, there is restriction in travelling to the site.
- (iv) Sending samplers to IVL by normal mail was agreed to reduce the mailing cost

## **Pakistan**

- (i) NIA has two prospective stations near the India border, for selection as a Malé monitoring site.
- (ii) There may be difficulty in moving samples from the border to Islamabad.
- (iii) Passive samplers are currently positioned at roadside outside the EPA.
- (iv) Also use Japanese passive samplers which they analyse themselves and give good agreement with IVL samplers in urban setting.

## **Sri Lanka**

- (i) Technical personnel are changing. So SOPs (Standard Operating Procedures) are important, so that methods can be followed step by step.
- (ii) Stability of power is not available at the site
- (iii) Possibility of reducing the monitoring frequency due to increase in the cost of transportation.
- (iv) Due to a problem with lid of wet only sampler, they have made one of their own; the lid and funnel holder were found to get damaged fast.

### **General Comments and action points:**

- (i) The participants agreed to make a list of spare part needed for monitoring equipments at the site.
- (ii) IVL will discuss with MISU on the material used for lid, funnel holder and collector cover, which can resist the climate.
- (iii) MoC suggested to wash the funnel of the bulk collector weekly, during the dry season and this instruction will be included in the manual.
- (iv) MoC needed to decide on the use of biocide to prevent NH<sub>3</sub> loss from the rain water sample, during transit.
- (v) All sites need to provide meteorological data, especially the wind direction.

## **9. Closing Session**

The closing session started with a presentation on the results of analysis by the three Groups with their comments and suggestion on training and their experience at the AIT lab. This was followed by remarks from Mr. Sagar Dhara and Ms. Karin Sjoberg on behalf of the MoC and Dr. N. T. Kim Oanh on behalf of AIT. After that Mr. Surendra Shrestha, Regional Director, UNEP RRC.AP gave the closing remark and presented certificates to all the participants.