CONTINUOUS ENVIRONMENTAL MONITORING SYSTEM AND DATA MANAGEMENT

(Gandhi Nagar on 22.11.2014)

CENTRAL POLLUTION CONTROL BOARD
Consent orders of SPCBs/PCCs specify standards to be complied by industries.
Industries submit analysis reports to SPCBs/PCCs and invariably copies are marked to CPCB.
Reports submitted by industries largely comply with the consent standard limits in contrast to the samples collected by SPCBs/PCCs/CPCB that by and large remains non complying.
Actions (based on manual monitoring methodology) against industries are not leading to improvement in treatment processes by the units besides the willingness of persistent defaulters remains non committal.
Regulatory Regime (contd.)

- Monitoring mechanism is weak due to lack of logistics, manpower and resources among the SPCBs/PCCs/CPCB obviously due to vastness of the jurisdiction area for regional offices and Zonal offices.

- Remedy is to put in place alternate monitoring mechanism on self monitoring methodology by industries and provide online data to regulatory regime.
National Policy on Online Monitoring

In “National Environment Policy” it is envisaged that to strengthen the testing infrastructure and network for monitoring ambient environmental quality and progressively ensure real-time, and online availability of the monitoring data.
Background

- Central Pollution Control Board issued directions to SPCBs/PCCs for setting up of Real Time Monitoring Systems in February 2014.
Real Time Monitoring System – Why

- Self Monitoring mechanism within the industries
- Increased management responsibility for regulatory compliance
- Increased cost-effectiveness
- Fast corrective action
- Improved control over impacts on the environment
- Higher environmental awareness
- Increased public access to information (public
Guidelines for RTMS

• RTMS should be equipped to analyse specified parameters on real time basis
• RTMS shall consist of standalone unmanned monitoring stations/system equipped with GSM/GPRS modem and other communication modes for transmission of real time data to a central receiving station (CRS)
• CRS/Server to be located at industrial unit/service provider/SPCBs/PCCs and CPCB.
• Central receiving station should have capability to receive, analyze and archive the data received from RTMS with alarm system.
Guidelines for RTMS (contd.)

• Verification of data generated through RTMS shall be cross checked by manual monitoring and analysis of samples by SPCBs/PCCs to assess the efficacy, accuracy, precision and reliability of equipment's.

• Industrial units shall inform SPCBs/PCCs/CPCB about setting up of RTMS by submitting installation and commissioning reports with the technical details of equipment's and their worthiness.

• Physical verification of installation of equipment's shall be carried out by SPCBs/PCCs
Site Selection

• Fixing of site for installation of RTMS should be representative and in compliance to provisions of Consent Management (notified effluent outfall with coordinates-Global Positioning System) to assess temporal changes in the quality of effluent/ emissions discharged by the industrial unit.

• Monitoring site should be accurately displayed with written station location.

• Photographic evidence should be obtained in the documentation.
Monitoring Systems operated by Industries

Air Pollution Monitoring System
- Emission Monitoring Systems
- Ambient Air Quality Monitoring Systems

Water Pollution Monitoring System
- Effluent Monitoring Systems
Continuous Monitoring Systems

- Flue Gas Flow Monitor
- Dust Monitor
- Flue Gas Analyzer
- Local Server with DAS
- Central Server with DAS
- Ambient Air Quality Monitoring Station
- LAN or WAN
- Internet
- Pollution Control Board

CAAQM Pollution Control Board
Central Server with DAS
Local Server with DAS
Air Pollution Monitoring Systems

- Multigas Analysers
- In Situ Analyzers
- Integrated indoor cabinet
- FTIR-based analyzer
- Dilution Based Analyzers
Data use till date

Industries had connected these CMS instrument’s output to their control rooms through PLC (Programmable Logic Controllers) to check on emission/effluent levels (Industry specific parameter limits are already prescribed by SPCBs/CPCB) to check the performance of plant and if required have changed the combustion element ratios.
Requirements of System

Proposed system should be capable of

1. **Data collection** on Real Time basis without human intervention.
2. Data Collection from any REAL TIME SYSTEM.
3. **Providing data to all stake holders** without delay.
4. Collection of **Performance criteria parameters & Health status**
5. Providing **tamper proof mechanism**.
6. Providing facility for **online calibration** of systems.
7. Providing a system of change request management with recording mechanism for **data validation** purpose.
8. Having **Dashboards** for facilitating SPCBs/PCCs/CPCB intelligent surveillance display for meaningful application of data.
9. Generating **ALERTS** in case of violation of stipulated standards.
10. Accommodating existing technology based Systems (Digital) with minimum variation.

11. Accommodating any new requirements of additional parameter monitoring in future.

12. Continuous Transfer of Real Time data for display on industry website & Industry main gate.


15. Creating a National Database for Policy & Decision Makers at a single GIS map.
How the entire system should work?

INDUSTRIES

Existing Systems

Validation & Verification

SPCBs/PCCs

Data Synchro nization

CPCB

Data on Website

WEB

New Systems

Data Transmission

Records
1. Continuous Data
2. Validation events
3. Calibration
4. Cross verification issues

Scrutiny

Data available for Policy makers/Public

2. Validation events
3. Calibration
4. Cross verification issues
Data Transmission

- **Transmission Medium**: Preferential order

1. Leased Circuit of 512 Kbps or 1Mbps
2. Broadband telephone connection
3. GSM/GPRS
4. Satellite Insat/ Vsat

- Leased Line
- Broadband
- Wireless connection
Protocol’s Functionality

A protocol is a set of rules which governs the transfer of data between computers. Protocols allow communication between computers and networks. Handshaking is used to establish which protocols to use. Handshaking controls the flow of data between computers. Protocols will determine the speed of transmission, error checking method, size of bytes, and whether synchronous or asynchronous.
Presentation Outline

- Data Viewing
- Data Verification
- Real-time Environmental Data – Presentation and Reporting
Data Viewing

- Data received from real-time monitoring systems should be viewed regularly.
- Dedicated teams of experts will have to monitor the data 24X7.
- Daily, Weekly, Monthly and Yearly data trends should be viewed to ensure correct data is being generated and transmitted.
- If irregularities in the data is found then verification of the monitoring systems is required.
System Verification

Checking the diagnostics of the instrument

SO2 diagnostics is ok.....
Remote Calibration

Central Server

Internet Connectivity

Solenoid Valve

Analyzer

Stack

Solenoid Valve

Calibration Gas
Data Presentation

• By Geo-referencing monitoring stations on GIS Platform
• Different layers on map as per type of monitoring stations, sector & category of the industries
• Dash Board – summary of data of all monitoring stations
• Report Generation
  – Station Report (Hourly, Weekly, Monthly, Yearly, Periodic)
  – Multi station reports
  – Diurnal reports
  – Wind Rose
  – Pollution rose etc.
Flow of Information

- Summarizing, Analysis and Interpretation
- Use of Real-time Environmental Data
Summarizing

Analysis

Interpretation
Use of Real-time Environmental Data

- By Regulators
- By Industries
- Others Uses
Use of Real-time Environmental Data

By Regulators

A
- Regulatory Compliance
- Pollution Prevention and Control

B
- Policy Designing, Planning and Siting
- Mitigation and Response

C
- To Keep Track of Project / Program Success
- Cleanup and Remediation Science
Use of Real-time Environmental Data

By Industries

- To Avoid Non-Compliance
- Real-time Data Acquisition & Analysis Tools

- Market Trading Systems
- Responsible Corporate Citizenship

- Leveraging Enterprise + ERP Systems
Use of Real-time Environmental Data

Other Uses

Integration of Real-time Environmental Data with GIS

Study Impact of Pollution and Benefits and Costs of Pollution Control Measures

Use by Common People to know Environmental Impacts and Awareness
Conclusion

- Whatever way the data may be gathered and analyzed, the data itself reflects processes that are occurring in the real world.
- Factors such as pesticide in drinking water or changes in ambient air quality may be represented by numbers or charts, but in reality they represent impacts on individual organisms, on human and biological communities, and on entire ecosystems.
- Scientists, policy makers, and the public should do well to realize that decisions based on data, however arcane, ultimately translate back to the real world as actions and outcomes.
PM’s Independence Day Speech

Hon’ble Prime Minister has laid emphasis on Zero effect & Zero defect system

- Zero defect-compliance with norms
- Zero effect- compliance prevents impact on environment
Thank You for your Kind Attention