National Ambient Air Quality Monitoring Norms & Standards: Authority Perspective
Session 2.3

Presented by: Patience Gwaze
Air Quality Management
Department of Environmental Affairs
Presentation Outline

• AQ Monitoring Norms & Standards Objectives
• Project Approach and Progress
• AQ Monitoring Norms & Standards Scope
  – Chapters Summaries
  – Highlights on a Few Sections
  – Focusing on Authority Perspective
• Way Forward
Project Objectives

• Develop National Ambient Air Quality Monitoring Norms & Standards *(Protocols and Procedures)*
  – Provides guidance to help achieve accurate and representative ambient air quality monitoring – for compliance with NAAQS
  – Using nationally consistent monitoring methods and reporting formats

• **Operational** Standards – process flows (Chapters 2, 4-6, 9)

• **Technical** Standards (Chapters 3, 7 and 8)
AQM Norms & Standards Principles

• **Correct** – air quality monitoring is of high quality, based on regulatory reference methods as prescribed in Section 9 of the AQA for continuous monitoring; and appropriate monitoring and analytical methods in passive sampling.

• **Representative** – relevant spatial / temporal variations and the extent of human exposure are considered when designing monitoring networks.

• **Consistent** – air quality data is recorded, analysed, processed, reported and archived following best-practice principles.

• **Accessible** – all users of air quality data have quick and easy access to methods, procedures and new developments in air quality monitoring and reporting.
AQA Empowering Provisions

Section 7(1) “The Minister must .....by notice in the Gazette, establish a national framework, for achieving the objectives of this Act, which must include:

– (d) national norms and standards for air quality monitoring;
– (f) national norms and standards for air quality information management.

Section 7 (2) National norms and standards established in terms of subsection (1) must be aimed at ensuring: -

– opportunities for public participation in the protection and enhancement of air quality;
– public access to air quality information;
– the prevention of air pollution and degradation of air quality;
– the reduction of discharges likely to impair air quality, including the reduction of air pollution at source;
– the promotion of efficient and effective air quality management;
– effective air quality monitoring;
– regular reporting on air quality; and
– compliance with the Republic’s obligations in terms of international agreements.
Applicability of AQ Monitoring Standards

• **NAAQS** – assessment of all ambient pollutants shall be conducted in terms of Section 5.2.1.3 of the National Framework -
  – In ambient air quality monitoring by all spheres of government from national, provinces and municipalities (metro, district and local) as prescribed in Section 8 a(i), b(i) and 8 c of AQA
  – In ambient air quality monitoring by Provisional Atmospheric Emission Licence or Atmospheric Emission Licence holders for on-site ambient air quality monitoring and reporting as prescribed in Section 43 (j) of AQA
  – In dust fall monitoring programme in line with regulations made under Section 32 of AQA

• When government departments undertake passive sampling to compliment / supplement air quality monitoring programs
Project Approach and Progress

- First national meeting – 19 September 2012
- Scope defined and agreed upon
- Writing of chapters by authors
- Technical meeting for authors – 11 Sep 2013
- Presentation of draft at Lekgotla and Wednesday workshop
- Comments to feed into draft document
- Finalisation of draft for submission to DEA by February 2014
AQ Monitoring Norms & Standards Scope
AQ Monitoring Norms & Standards Scope

• Chapter 1: Introduction
• Chapter 2: Ambient Air Quality Monitoring Planning
• Chapter 3: Ambient Air Quality Monitoring Methods
• Chapter 4: Operation of a Monitoring Network
• Chapter 5: Air Quality Monitoring Using Alternative methods – Passive Sampling and Dust Monitoring
• Chapter 6: Meteorological Monitoring
• Chapter 7: Data Management Protocols
• Chapter 8: Air Quality Monitoring Data Reporting
• Chapter 9: Monitoring Network Performance Management
Chapter 1. Introduction

• 1.1 Background
• 1.2 Objectives of AQ Monitoring Standards
• 1.3 Legislative Context
• 1.4 AQ Monitoring Standards Audience
• 1.5 AQ Monitoring Standards Development and Review Processes
• 1.6 AQ Monitoring Standards Scope and Structure
Chapter 2 – Ambient Air Quality Monitoring Planning

• 2.1 AQ Monitoring Plan *(Standard Station Plan)*
• 2.2 Monitoring Network Design and Station Siting
• 2.3 Monitoring Station Classification
• 2.4 Measuring Air Quality in the Vicinity of Stationary Emission Sources
• 2.5 Monitoring Shelter
• 2.6 Probe Placement and Sampling Line
• 2.7 Monitoring Site Metadata (Templates)
Air Quality Monitoring Planning

1. Establish monitoring needs
2. Establish air quality monitoring objectives
3. Identify locations to monitor
4. Identify air pollutants to monitor
5. Identify measurement methodologies
6. Establish station management plan
7. Establish data management protocols
8. Establish data storage and reporting protocols
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Step 1: Desktop Study to Establish Air Quality Monitoring Needs…..

- Emissions sources and pollutant types (eg, domestic, industrial, transport, agricultural and natural) and the
- Meteorology (eg, areas prone to temperature inversions)
- Topography
- Geography e.g., land use
- Population centres (especially where domestic fires and traffic emissions occur)
- Historical monitoring data (where available)
- **DEA to provide technical support to authorities**
Step 1: Desktop Study to Establish Air Quality Monitoring Needs…..

- Areas with high natural environmental values (e.g., in and around natural parks, forests, wilderness areas and wetlands)
- Location of sensitive areas particularly vulnerable to air pollution
- Areas planned for development (e.g., to get a picture of background concentrations, Waterberg Bojanala)
- Any public complaints or issues of concern relating to air pollution
- Any epidemiological studies on air quality effects on health already carried out
- **DEA to provide technical support to authorities**
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Step 2. Establish Air Quality Monitoring Objectives

- Determining the level of contaminants and compare with NAAQS
- Reporting on the state of the environment
- Providing air quality information for policy or strategy development
- Assessing the effectiveness of policy based on air quality trends
- Obtaining data for air quality modelling
- Conducting air quality research
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Monitoring Network Design and Station Siting

- Spatial and temporal representativeness
- Comparability
- Physically appropriate site
- Topographical and meteorological factors
- Recommendations on locations to avoid
## 2.3 Monitoring Station Classification

<table>
<thead>
<tr>
<th>Site Classification</th>
<th>Code</th>
<th>Characteristics - Sources, spatial scale,</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial</td>
<td>A</td>
<td>Microscale, Industrial sources,</td>
</tr>
<tr>
<td>Urban Peri-urban</td>
<td>B</td>
<td>Macroscale, a combination of sources</td>
</tr>
<tr>
<td>Sub-urban</td>
<td>C</td>
<td>Macroscale, residential sources</td>
</tr>
<tr>
<td>• (SA specific)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traffic</td>
<td>D</td>
<td>Microscale, traffic sources</td>
</tr>
<tr>
<td>• Roadside</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Street canyon</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Background</td>
<td>E</td>
<td>Regional, influence of regional transportation</td>
</tr>
</tbody>
</table>
Measuring Air Quality in the Vicinity of Stationary Emission Sources

- **Microscale** — Compliance monitoring site
- Scale typify relatively small areas immediately adjacent to: AEL holders and dust monitoring
- Data collected characterize exposure over areas of limited spatial extent and population exposure
- Data provide information useful for evaluating and developing *source oriented* control measures
Authorities Perspectives: Steps 1-3

• Review all monitoring stations reporting to SAAQIS with support from DEA

• Classify all stations per site classification

• Add meta data for all stations reporting to SAAQIS
  – Monitoring objectives
  – Station location
  – Sources
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Chapter 3. Ambient Air Quality Monitoring Methods – Summaries

• Measurement Procedures for the Determination of Particulate Matter Concentrations – PM$_{10/2.5}$

• Measurement Procedures for the Determination of Gases Concentrations
  \[\text{SO}_2, \text{NO}_2, \text{CO, O}_3, \text{C}_6\text{H}_6, \text{Pb}\]

• **Equivalent methods** – document proof of equivalency from a SANAS accredited laboratory –

• Protocols for equivalent measurement standards – NMISA participation
Authorities Perspectives: Steps 4-5

- Authorities to review all monitoring stations reporting to SAAQIS with support from DEA
- Audit all stations monitoring methodologies to align to Section 9 of the AQA
- Flag stations with “other methods”
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Step 6. Establish Station Management Plan

1. Necessary protocols, procedures and work instructions available to enable staff to effectively undertake AQ monitoring

2. Personnel capacitating of staff involved in the operation, maintenance, calibration and reporting activities with the necessary training skill, expertise and qualification to undertake the work

3. Plan to secure adequate resources (staff, equipment, spares, consumables etc) to undertake the monitoring initiative
Chapter 4. Operation of a Monitoring Network

• Operational documentation - Quality System Documentation (SANAS Requirements)
• Calibrations (Templates)
• Frequency of maintenance and calibration activities
• Daily checks (Templates)
• Routine station visits (Templates)
• Non-routine station visits (Templates)
• Performance acceptance criteria
• Maintenance and servicing (Templates)
• Annual network audits (Templates)
Chapter 5. Air Quality Monitoring Using Alternative Methods

• Measurement Strategy for Passive Sampling
• Measurement Procedures for the Determination of Gases Concentrations by Passive Sampling
  – \( \text{NO}_2, \text{O}_3, \text{SO}_2, \text{VOCs} \) sampling, etc
• Passive Sampling Quality Control and Quality Assurance Procedures
• Passive Sampling Data Management and Reporting
• Dust Monitoring Planning, Measurement, Data QA/QC and Reporting
Chapter 6. Guidance on Meteorological Monitoring

• Meteorological Data Monitors
  – Standard meteorological parameters
  – Calibration (Templates)
  – Operation and Maintenance (Templates)
  – Instrument Auditing (Templates)

• Meteorological Data Validation and Verification
  – Wind direction
  – Threshold for calm conditions

• Meteorological Data Generated by Data Acquisition Systems (DAS)
Authorities Perspectives: Step 6

• DEA to assist authorities in **reviewing / developing** station management plans
• Ensure that all stations have plans in place
• Reporting templates will form part of these standards
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Step 7. Establish data management protocols

- The data obtained from air quality measurement systems is representative of the spatial scale being investigated.
- Minimum data capture rate of **95%** is achieved
- Minimum of **75%** valid data is collected when calculating averages
- Measurements are accurate, precise and traceable
- Data is comparable and reproducible, internally consistent and comparable with national, international and other accepted standards
Chapter 7. Data Management Protocols

- Data Acquisition Systems
- Data Quality Assurance and Quality Control
  - Sampling frequency, data recovery
- Data Validation
- Missing and Negative Data
- Monitoring Site Metadata
Authorities Perspectives: Steps 7

• Review all monitoring stations reporting to SAAQIS with support from DEA
• Provide support on establishing standard data management protocols to align with requirements
• Upgrading of SAAQIS system for improved data management
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Step 8. Establish data storage and reporting protocols

- Who data is to be reported to
- How data is to be reported to different users and on several platforms including monthly reports, online, SAAQIS
- How data is to be reported, e.g., exceedances, the Air Quality Index (AQI),
- How the public will have access to ambient air quality data
- How data will be stored and archived for future generations
Chapter 8. Air Quality Monitoring Data Reporting

• Reporting of Ambient Air Quality Monitoring
  – Monthly reporting (Templates) SoA,
  – Reporting to SAAQIS

• Information for the Public on Air Quality
  – Air Quality Index (Templates)
  – Including the reporting air quality on several media platforms, air quality index
Chapter 9. Monitoring Network Performance Management

- Proficiency Testing Protocols
- SANAS Accreditation Protocols
  - Preparing for SANAS Accreditation
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Concluding Remarks

• Comments to feed into draft document
• Finalisation of draft for submission to DEA by February 2014
• How/what authorities should prepare for before the promulgation of these standards
• Critical components that need to be put in place for effective air quality monitoring
  – Existing stations – MONITORING PLANS, QUALITY DOCUMENTATION SYSTEMS, DEA SUPPORT, TEMPLATES
  - SANAS
  – New stations – MONITORING PLANS
Thank you

pgwaze@environment.gov.za

012-395-1846