

Section 1. Background and Objectives

1.1 Rationale for a Strategy.

Ambient monitoring systems are a critical part of the Nation's air program infrastructure. Data from these systems are used to characterize "air quality" and associated health and ecosystem impacts, develop emission strategies to reduce adverse impacts, and account for progress over time. The United States spends well over \$200 million annually on routine ambient air monitoring programs, a figure dwarfed by the billions associated with emission reduction strategies. Ambient data provide a basis for accounting of air program progress thereby determining the value of those investments. Obviously, the investment in and role played by our networks demand periodic strategic planning.

Dramatic and mostly positive changes in air quality have been observed over the last two decades, despite increasing population, vehicle usage, and productivity. Most criteria pollutant measurements read well below national standards (Figure 1-1). While the more obvious

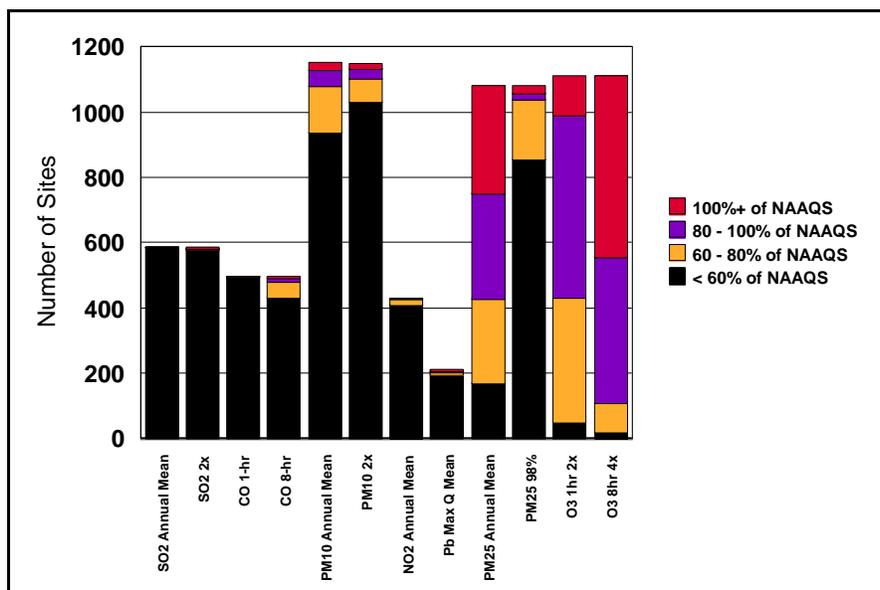


Figure 1-1. Number of monitors measuring values relative to the National Ambient Air Quality Standards based on AIRS data through 1999. Great progress has been made in reducing ambient concentrations of most criteria measurements. Ozone and PM_{2.5} dominate the nonattainment picture on a national scale.

problems of widespread elevated lead and gaseous criteria pollutant problems largely have been solved, current and future problems in particulate matter, ozone, and air toxics challenge air programs. These challenges reside in very complex air pollution behavior (e.g., nonlinear relationships between emission sources and atmospheric concentrations) with increasing knowledge that very low, and difficult to measure, air pollution levels are associated with

adverse environmental and human welfare effects. New directions in air monitoring are needed to reflect the successful progress in reducing air pollution and incorporate new scientific findings and technologies.

Ambient air measurements produced by State and Local agencies and Tribes (SLTs) are high quality, credible environmental data that service a broad spectrum of clients. The challenge is to maintain and improve upon a valued product. Monitoring programs are subject to continual changes in SLT, Federal and research priorities. New and revised national ambient air quality standards (NAAQS), changing air quality (e.g., significantly reduced concentrations of criteria pollutants) and an influx of scientific findings and technological advancements challenge the response capability of the Nation's networks. The single-pollutant measurement approach, commonly administered in networks, is not an optimal design for integrated air quality management approaches that can be optimized by accounting for numerous programmatic and technical linkages across ozone, fine particulate matter, regional haze, air toxics, and related multi-media interactions (e.g., atmospheric deposition). Indeed, the current design of the Nation's networks is based largely on the existing monitoring regulations (Code of Federal Regulations [CFR], Parts 53 and 58) that were developed in the late 1970's. Complicating a desire to implement change is the need to retain stability in ambient air networks for the detection of long term air pollution trends.

1.2 Goal and Objectives

Given this backdrop, *the overarching goal of this air monitoring strategy is to improve the scientific and technical competency of the nation's air monitoring networks while increasing our ability to protect public and environmental welfare; and to accomplish this in flexible ways that accommodate future needs in an optimized resource constrained environment.* The following monitoring **strategy**¹ objectives provide the framework for achieving this broad based goal:

- To manage the Nation's air monitoring networks in a dynamic manner that addresses the most pressing public health issues, optimizes efficiency, and accommodates future needs, and continually challenges the value of networks.
- To establish a new air monitoring approach, coupling a minimum level of required national monitoring with flexible SLT air monitoring networks in order to efficiently and effectively meet both national and SLT needs.
- To provide a greater degree of timely (e.g., real-time) public air quality information, including the mapping of air pollution data and air quality forecasts.

¹ More specific monitoring data objectives are described under NCore, Section 4.

- To improve network efficiencies and cross network consistency through:
 - periodic network assessments
 - re-evaluation and modification of monitoring regulations
 - revision of quality assurance procedures
 - aggressive coordination across network operations
- To foster the utilization of new measurement method technologies.
- To encourage multi-pollutant measurements, where appropriate, for better air quality management and scientific/health-based data sets.
- To provide a base air monitoring structure which, in conjunction with special studies (not part of this Strategy), could be used to support certain regulatory needs, e.g., State Implementation Plan (SIP) development, source apportionment, operational model evaluation, and tracking progress of emissions reduction strategies.
- To develop and implement a major public information and outreach program as an important cornerstone toward network changes.
- To seek input from the scientific community as to the merit/value of proposed changes.
- To provide air monitoring platforms and data bases which can be used for other environmental purposes, such as area-based ecosystem assessments, global issues, diagnostic research, and biological sensing.
- To assess, periodically, funding levels needed to maintain support for this monitoring strategy, and incorporate recommendations into the budget planning process.

1.3 Scope of Participants and Key Operating Principles

A National Monitoring Steering Committee (NMSC), with representatives from EPA (Environmental Protection Agency) OAQPS (Office of Air Quality Planning and Standards), EPA ORD (Office of Research and Development), EPA Regional Offices (ROs), and SLTs, was developed to provide oversight and guidance. This NMSC structure reflects both the partnership across EPA and its major grantees as well as an intent to limit participation initially to focus on a manageable subset of clients and increase probability for progress. Clearly, the scope of this effort must expand to other entities as numerous leveraging and common interest opportunities exist with industry, other Federal agencies, and the international community. This expansion has started through discussions with NARSTO, the Committee for Environment and Natural Resources (CENR), PM Health and Supersite Principal Investigators, and initiation of Scientific

Advisory Board review. This current effort should be perceived as the foundation for the strategy.

The following operating principles reflect this important partnership across EPA and its grantee organizations as well as embracing the goal and objectives of the strategy:

- **Partnership.** Consensus building is used to corroborate strategic planning elements among EPA and SLTs.
- **Flexibility by Balancing National and Local Needs.** Network design, divestment and investment decisions must achieve a balance between prescription (consistency) and flexibility to accommodate national and local monitoring objectives. Although localized issues are “national” issues, and nationally consistent data bases serve local (SLT agency) interests, allowances must be made for differing needs arising from both perspectives.
- **Effective Interfacing with “Science.”** An emphasis should be placed on more active engagement with the scientific community, recognizing the important role science plays in network design and technology and the role of networks in assisting scientific research. The perspective that a clear demarcation exists between science-oriented and Agency- based monitoring is counterproductive to the larger goal of improving air monitoring.
- **Zero Sum Resource Assumptions.** This Strategy is not a vehicle to add significant resources for air measurements. Relatively stable but flat spending is projected for air monitoring activities. This level resource assumption requires a reduction in current efforts to accommodate new monitoring needs. The Strategy includes very modest resource proposals (i.e., an insignificant fraction of current monitoring resources) required to catalyze certain technology elements of the Strategy. Furthermore, the Strategy intends to retain the basic infrastructure and operational stability of existing agencies. Reallocation implies shifts to different pollutant measurements and technologies, and not significant resource shifts across geographical regimes.
- **Data Analysis and Interpretation.** Too often, large data collection programs sacrifice data analysis tasks due to a lack of protected or dedicated analysis resources, available guidance and expertise, or declining project interest (which often peaks at program start up). The Photochemical Assessment Measurement Stations PAMS program suffered from these effects, which were compounded by a lack of patience associated with a desire for short term results from a program designed to address long term trends. A good example has been established by the emerging air toxics program which has set aside significant resources for analysis of historical and new pilot city data prior to large scale network deployment. Networks will operate more efficiently when periodic active analyses are performed that identify strengths and weaknesses and provide more dynamic direction for modifications.

1.4 Recommendations

In proposing this Strategy, the NMSC is recommending several key changes to the way air monitoring is conducted. These changes will allow for more efficient collection and universal use of air quality data, and greater flexibility in air monitoring to meet the challenges of the 21st Century in ways that meet both national and local monitoring needs. The key recommendations are:

- The networks need to produce more insightful data by:
 - including a greater level of multi-pollutant monitoring sites in representative urban and rural areas across the Nation
 - expanding use of advanced continuously operating instruments and new information transfer technologies
 - integrating emerging hazardous air pollutant (HAPs) measurements into mainstream monitoring networks
 - supporting advanced research level stations
- A new national monitoring network design (called NCore) should accommodate these recommendations and the major demands of air monitoring networks, such as:
 - trend determinations
 - reporting to the public
 - assessing the effectiveness of emission reduction strategies
 - providing data for health assessments and NAAQS review
 - determinations of attainment and nonattainment status.
- ***Flexibility*** must be maintained and even increased for SLT's to address local and area-specific issues including, for example, environmental justice concerns, episodic PM and ozone events, and "local" or hot spot air toxics concerns.
- Periodic ***assessments*** of air monitoring networks must be performed to determine if the existing network structure is optimally meeting national and local objectives. The current national review of the networks indicate that many criteria pollutant measurements (e.g., nitrogen and sulfur dioxides, carbon monoxide, PM₁₀) are providing only limited value which present opportunities to realign air monitoring resources in more relevant areas. Such assessments and network decisions are best addressed through regional level evaluations.
- The network modifications, including NCore, should be conducted within current resource allocations used to support monitoring (e.g., with respect to staffing). However, there needs to be modest investments in new equipment to upgrade monitoring systems to meet new priorities and accommodate advanced technologies.

- Recommendations for network changes should engage the public. A strong public communications program is advocated, both at the national and local levels.
- Existing monitoring regulations require modification and promulgation by EPA to accommodate recommended network changes.

This document describes these recommendations in more detail and provides a framework to implement them.