Overview

- Objectives and Types of Air Monitoring
- Overview of Air Monitoring Networks
  - Federal/ California State Programs
  - Special Purpose Monitoring
  - Event/ Response Monitoring
- Network Connections and Layers
- Leveraging

http://www.livescience.com/27111-air-pollution-monitoring.html
Objectives of Air Monitoring

- Support Compliance with Air Quality Standards and Emission Strategy Development
- Support Air Pollution Research
- Provide Air Pollution Data to the General Public
Types of Air Monitoring

- Ambient Air Network Monitoring
  - Support of U.S. EPA/State Air Monitoring Programs
  - State Implementation Plan (SIP) development
  - PSD plans

- Special Projects
  - Facility monitoring (Compliance)
  - Research
  - Community monitoring

- Nuisance and Emergency Response
  - Accidents (Facility, Railroad)
  - Odors
  - Wildfires
Air Monitoring Applications

- Background Level
- High Concentration Area Identification
- Pollutant Transport
- Population Exposure
- Representative Concentration
- Source Impacts
- Trend Analysis
- Site Comparison
- Real Time Reporting
- Forecasting
Monitoring Programs

- Criteria Pollutant Monitoring Program (SLAMS/NCORE)
- Photochemical Assessment Monitoring Stations (PAMS)
- National Air Toxics Trends Stations (NATTS)/ California Air Toxics
- PM2.5 Speciation Program
- Special Monitoring
- Event/ Response Monitoring
State and Local Air Monitoring Network (SLAMS)

- Objectives
  - NAAQS Comparison
  - Needs of SIP requirements

- Pollutants Measured
  - CO, SO2, NO2, O3, PM2.5, PM10, Pb

- Network Size
  - ~4,000 monitors

- Representativeness
  - Spatial
  - Temporal
  - Comparable

- Requirements
  - 40 CFR Part 58 Appendix A
  - Use of FRM, FEM, and ARM monitors
Objectives – Multipollutant Strategy
- Support for development of emission strategies
- Assessment of emission reduction programs
- Support for long-term health assessments
- Support scientific studies
- Study ecosystem impacts of air pollution.

Pollutants Measured (Trace level)
- $O_3$, SO2, CO, NO and NOy, PM$_{2.5}$, PM$_{2.5}$ speciation, PM$_{10-2.5}$, and meteorology

Network Size
- 80 Sites
Photochemical Air Monitoring Stations (PAMS)

- **Description** - Program for enhanced monitoring of ozone, oxides of nitrogen (NOx), and volatile organic compounds (VOC) to obtain more comprehensive and representative data on ozone air pollution. Required under 1990 Clean Air Act Amendments in nonattainment areas classified as serious, severe, or extreme.

- **Objectives:**
  - Pollution trends
  - Database for photochemical model evaluation
    - Assessing control strategy
    - Developing future control strategies
  - Provide speciated database for source emissions profiles

- **Pollutants Measured:**
  - Ozone
  - NO/ NO2/ Noy
  - CO
  - Carbonyls
  - Volatile Organic Hydrocarbons
    - 57 Hydrocarbons
Changes to PAMS target list

Auto GC

Upper Air Meteorology

Network Design

- All O3 non-attainment sites, but only one required
- Hourly VOC
- Carbonyls requirement
- All O3 non-attainment sites required to develop enhanced ozone monitoring plan
PM Chemical Speciation Network (CSN)

- **Objectives**
  - Annual and seasonal spatial characterization of aerosols
  - Trends and control program assessment
  - Comparison to Interagency Monitoring of Protected Visual Environments (IMPROVE) network
  - Development of emissions control strategies

- **Pollutants Measured**
  - Ions, metals, carbon species, and organic compounds

- **Network Size**
  - ~200 sites (May 2013)
National Toxics Trends Network (NATTS)

- Objectives
  - Trends for tracking progress on emission and risk reduction goals
  - Evaluation of public exposure
  - Risk characterization
  - Evaluation of air toxics emissions inventories and models

- Pollutants Measured
  - 33 Hazardous Air Pollutants (HAPS) including metals, VOCs and carbonyls

- Network Size
  - 22 sites: 15 urban and 7 rural
California Toxic Air Contaminants (TAC) Monitoring

- Established in 1985
- Objectives
  - Determine average annual concentrations
  - Assess effectiveness of controls
- Pollutants Measured:
  - VOC
  - Carbonyls
  - Toxic Metals
  - Hexavalent Chromium
- Network Size
  - 20 sites
Interagency Monitoring of Protected Visual Environments (IMPROVE) Network

- **Objectives**
  - Establish visibility and aerosol conditions in national parks and wilderness areas
  - Identify compounds and sources that contribute to visibility impairment
  - Trends
  - Provide monitoring for the Regional Haze Rule

- **Pollutants Measured**
  - PM10, PM2.5, heavier PM2.5 elements, carbon, optical parameters

- **Network Size**
  - ~110
Clean Air Status and Trends Network (CASTNET)

- **Objectives**
  - Track effectiveness of national and regional scale emission control programs
  - Spatial and temporal trends
  - Provide understanding environmental effects to sensitive terrestrial and aquatic receptor areas

- **Pollutants Measured**
  - Sulfate, nitrate, ammonium, sulfur dioxide, nitric acid, cations
  - Ozone (Meets Appendix A requirements)

- **Network Size**
Other Air Monitoring Programs

- Greenhouse Gases
- California Ambient Dioxin Air Monitoring (CADAMP)
  - [http://www.arb.ca.gov/aaqm/qmosopas/dioxins/dioxins.htm](http://www.arb.ca.gov/aaqm/qmosopas/dioxins/dioxins.htm)
- National Atmospheric Deposition Network
  - [http://nadp.sws.uiuc.edu/](http://nadp.sws.uiuc.edu/)
- National Air Toxics Assessment (NATA)
  - [http://www.epa.gov/ttn/atw/nata/index.html](http://www.epa.gov/ttn/atw/nata/index.html)
Monitors providing data for special studies to support SIP and other air program activities and that has been designated in the ANP and AQS

- Not permanently established
- May change with agency priority
- Do not count towards minimum monitoring requirements
- **Can be operated for 24 months, but can be used for regulatory purposes after 24 months**
- If meet Appendix A requirements, data must be submitted to AQS
Objectives

- Measurements
  - Address a specific question
  - Toxics, particulates, Cr6+, etc.
  - Both time integrated and continuous sampling
- Adequacy of Coverage
  - Upwind/Downwind
  - Good spatial coverage to capture gradients of exposure
  - Sampling period to cover seasonal differences

Monitoring Findings and Community Notification

- Results are analyzed and determinations are made
- Further sampling or compliance actions
- Community stakeholders are informed
Nuisance and Emergency Measurement Response

- Objectives
  - Respond to the field in a timely manner
    - Facility Incidents
    - Wildfires
    - Chemical Spills
    - Natural Events
  - Provide actionable air measurement information to the community or emergency services

- Pollutants
  - Odors (Sulfur gases)
  - PM2.5 (Wildfire)
  - Air Toxics
  - Hydrocarbons
  - Unknowns

- Air Agency Programs
  - Local Programs
  - CARB Emergency Response Program
  - Cal/EPA
  - California Air Response Planning Alliance (CARPA)
Air Monitoring Network Connections

- Program Objectives
  - Between U.S. EPA and state/local programs
  - Overlapping goals
    - Sites
    - Pollutants
- Interagency Interest
  - Neighboring regions
  - PQAO structure
Air Monitoring Network Layers

- Networks within Networks
  - Monitors run by other agencies/programs within area jurisdictions
    - Castnet
    - State / Local
      - NATTS/ CA TAC Monitoring

- Multiagency Coordination
  - Programs involve more than one agency to conduct monitoring and analysis activities
    - NATTS
    - PM2.5 Speciation
    - Collocation of Monitors

- Intra-agency Layers
  - Platforms used for multiple programs
  - Fixed Station in combination with Response Monitoring
Leveraging

- Station infrastructure
  - Emergency Response
  - Research
  - Method Development

- Instrumentation
  - Monitors can count towards several objectives
  - Local program priorities shifting

- Resources
  - Stations at edge of boundaries

- Quality Assurance
  - Audits
  - QA Documents
Air monitoring programs are diverse and have specific objectives and different requirements.

The variety of programs can be connected through objectives, geography, PQAO structure, etc.

Those connections can be leveraged to maximize data reporting and quality and minimizing some of the resources.