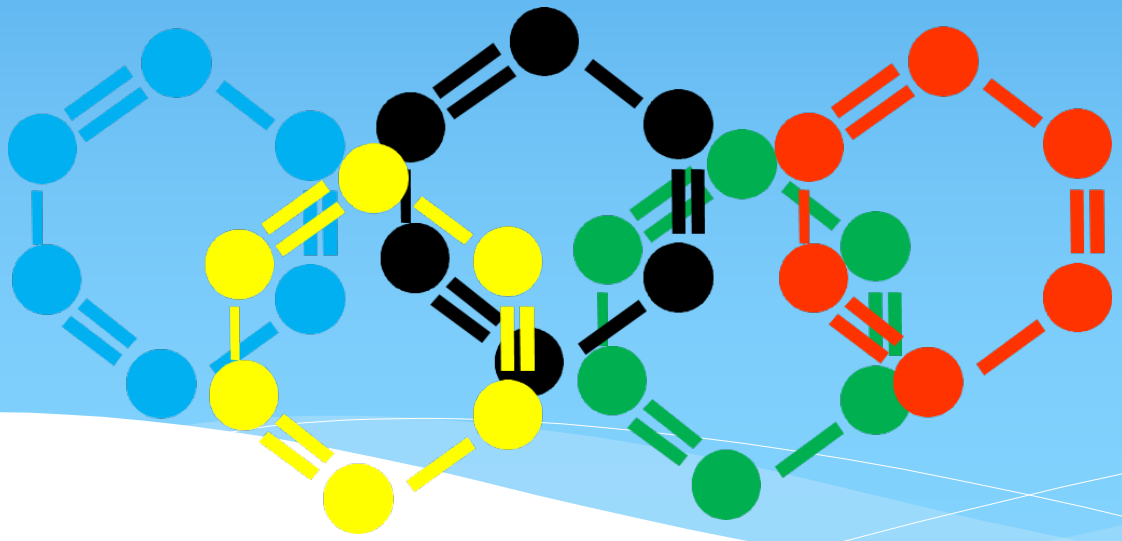
Northern Laboratory Branch

Beyond the Masses…



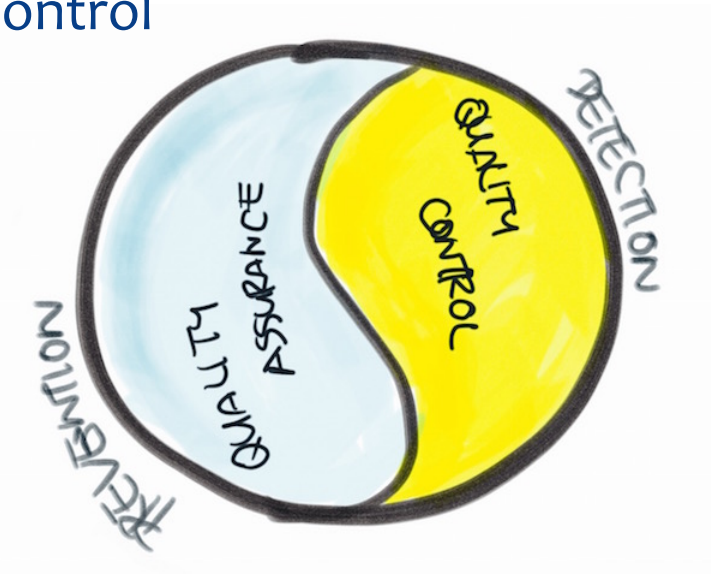
Topics

* Laboratory Overview
* Laboratory Analytical Services
* Laboratory Clients and Collaboration
* Analytical Data Quality
* How the Data are Used

Laboratory Overview

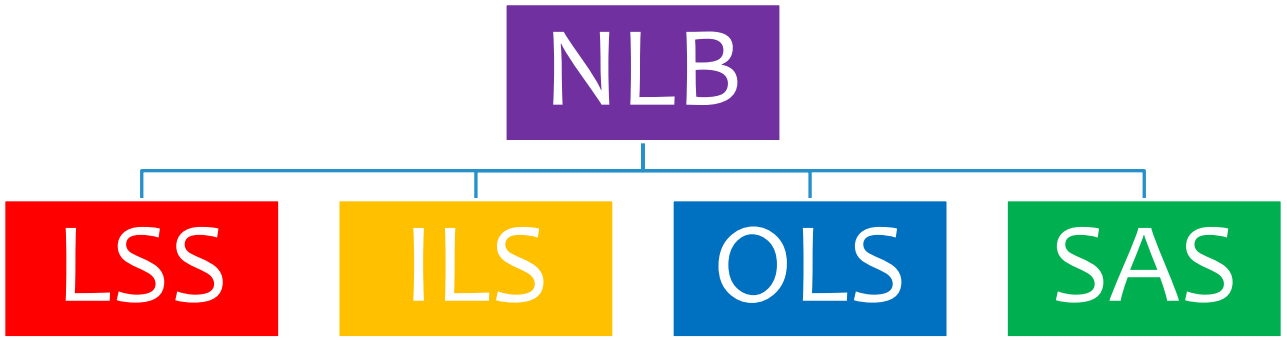
Laboratory Overview

* Laboratory Mission:
  * Provide Analytical Chemistry Services to Meet Federal/State Regulations and Client Expectations
  * Data Quality Assurance/Quality Control
  * Timely Data Reporting



Laboratory Overview

* Laboratory Organization
  * Laboratory Support Section
  * Inorganic Laboratory Section
  * Organic Laboratory Section
  * Special Analysis Section



Laboratory Overview

* Laboratory Support Section
  * Sample Control
  * Sample Shipping and Receiving
  * Quality Assurance/Quality Control Officer
  * Laboratory Information Management System Database Administrator
  * Laboratory Health and Safety Officer
  * Hazardous Waste Management

Laboratory Overview

* Inorganic Laboratory Section
  * Ambient Air Quality Monitoring
  * Criteria Pollutants
  * Toxic Air Contaminant Samples
  * Chemical Speciation Network
  * Sample Media Preparation

Laboratory Overview

* Organics Laboratory Section
  * Ambient Air Quality Monitoring
  * Toxic Air Contaminant Samples
  * Pesticides
  * Greenhouse Gases
  * Chemical Speciation Network
  * Sample Media Preparation

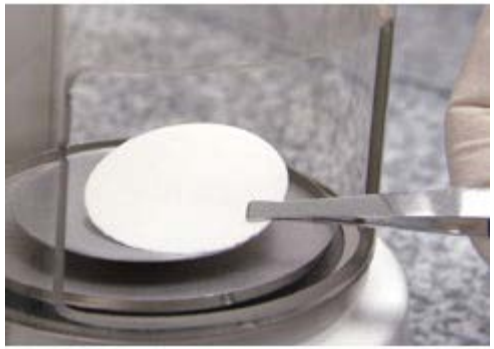
Laboratory Overview

* Special Analysis Section
  * Enforcement Division Support
  * Consumer Product Samples
  * Composition Wood Products
  * Method Development
  * Third Party Certification
  * Mini-Shed Testing

Laboratory Analytical Services

Laboratory Analytical Services

* Particulate Matter (PM) – Mass Analysis
  * Total Suspended Particulates (TSP)
  * PM_{10}
  * PM_{COARSE}
  * $PM_{2.5}$
  * $PM_{1.0}$



Laboratory Analytical Services

* Beyond Mass Analysis…
  * Criteria Pollutants
  * Chemical Speciation Network
  * Toxic Air Contaminants
  * Pesticides
  * Consumer Products
  * Formaldehyde in Composition Wood
  * Field Sampling Equipment Evaluations
  * Special Studies

Laboratory Analytical Services

* Criteria Pollutants
  * TSP Lead by Graphite Furnace Atomic Absorbance
  * Lead Ambient Air Quality Standard: 0.15 µg/m^3
  * Sunset Program
    * Contracting with Federal Laboratory
    * One California
    * One Mexico site

Laboratory Analytical Services

* Chemical Speciation Network – PM_{10} Ions by Ion Chromatography (IC)
  * Anions – the negatives (-)
    * Chloride, Sulfate*, Nitrate
  * Cations – the positives (+)
    * Ammonium, Potassium
* *State Sulfate Ambient Air Quality Standard
  * 24-hour concentration: 25 $\mu g/m^3$

Laboratory Analytical Services

* Chemical Speciation Network – $PM_{2.5}$
  * Ions by IC
    * Anions (-): Nitrate, Sulfate
    * Cations (+): Ammonium, Potassium, Sodium
  * Carbon by Thermal/Optical Absorbance
    * Elemental
    * Organic
  * Wood Smoke Tracers by Gas Chromatography (GC)
    * Levoglucosan, Mannosan, and Galactosan

Laboratory Analytical Services

* Chemical Speciation Network – $PM_{2.5}$
  * Metals by X-Ray Fluorescence Spectroscopy

Aluminum	Silicon	Lead
Phosphorus	Sulfur	Strontium
Chlorine	Potassium	Molybdenum
Calcium	Titanium	Antimony
Chromium	Manganese	Mercury
Iron	Cobalt	Rubidium
Nickel	Copper	Yittrium
Zinc	Arsenic	Tin
Selenium	Bromine	Barium

Laboratory Analytical Services

* Toxic Air Contaminants
  * California Toxic Air Contaminant Identification and Control Program (1985)
  * Volatile Organic Compounds
  * Carbonyl Compounds
  * Toxic Metals
  * Hexavalent Chromium
  * Hazardous Air Pollutants – Federal
    * National Air Toxics Trends Station (NATTS) Network

Laboratory Analytical Services

* Toxic Air Contaminants
  * Volatile Organic Compounds by GC-MS
  * Method SOP MLD 058 & 066

1,1,1-Trichloroethane	Styrene	Carbon Disulfide
1,3-Butadiene	Toluene	Chlorobenzene
Acetone	Trichloroethylene (TCE)	Freon 11
Acetonitrile	meta + para Xylene	Freon 12
Acrolein	ortho Xylene (o-xylene)	Freon 113
Acrylonitrile	cis-1,3-dichloropropene	m-Dichlorobenzene
Benzene	trans-1,3-dichloropropene	o-Dichlorobenzene
Bromomethane	Dichloromethane (DCM)	p-Dichlorobenzene
Carbon Tetrachloride	Ethylbenzene	Methyl Iodide
Chloroform	Perchloroethylene (PERC)	Vinyl Chloride

Laboratory Analytical Services

* Toxic Air Contaminants
  * Carbonyl Compounds by High Performance Liquid Chromatography (HPLC) – SOP MLD 022
    * Formaldehyde
    * Acetaldehyde
    * Methyl Ethylketone (MEK)

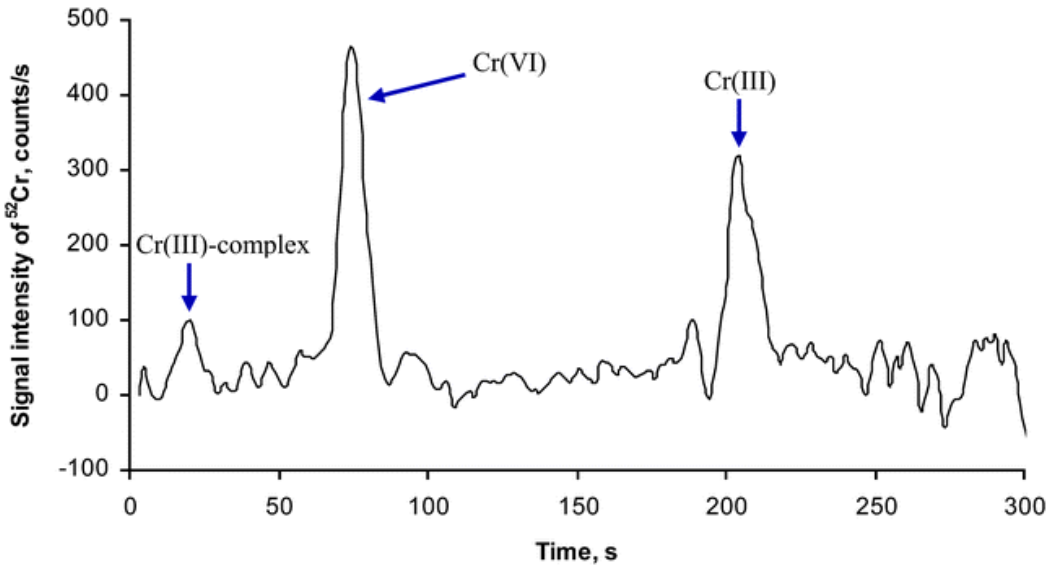
Laboratory Analytical Services

* Toxic Air Contaminants (Bold)
  * Metals by Inductively Coupled Plasma/Mass Spectrometry (ICP/MS) – SOP MLD061

Antimony	**Arsenic**	Strontium
Berrylium	**Cadmium**	Tin
Chromium	**Cobalt**	Vanadium
Copper	Iron	Zirconium
Lead	**Manganese**	Sulfur
Molybdenum	**Nickel**	Titanium
Platinum	**Selenium**	Zinc

Laboratory Analytical Services

* Toxic Air Contaminants
  * Hexavalent Chromium by IC
  * SOP MLD039



Laboratory Analytical Services

* Pesticides
  * Supports Department of Pesticide Regulation (DPR)
  * Toxic Air Contaminants
  * Ambient and Application Monitoring
  * Requires Substantial Method Development
  * Monitoring and Sample Collection
    * ARB's Air Quality Surveillance Branch
    * Air Pollution Control/Air Quality Management Districts

Laboratory Analytical Services

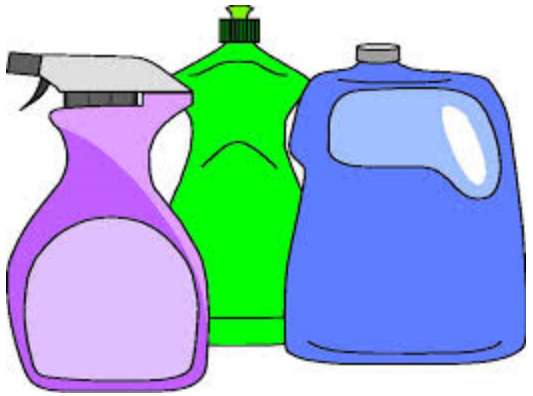
* Pesticides
  * Chlorpyrifos
  * Chloropicrin
  * Mancozeb/ETU
  * Methyl Isothiocyanate (MITC)
  * 2,4-Dichlorophenoxyacetic Acid Dimethylamine Salt (2,4-DMAS)

Laboratory Analytical Services

* Consumer Products
  * Chemically Formulated Products for Household or Institutional Consumer Use
  * California Code of Regulations
    * Developed by Air Quality Planning and Science Division
  * Control Emissions:
    * Volatile Organic Compounds
    * Toxic Air Contaminants
    * Greenhouse Gases
  * Notice of Violation by Enforcement Division

Laboratory Analytical Services

* Consumer Products
  * Detergents
  * Cleaning Compounds
  * Polishes
  * Floor Finishes
  * Cosmetics
  * Personal Care Products
  * Home, Lawn, and Garden Products
  * Disinfectants
  * Sanitizers
  * Aerosol Paints
  * Automotive Specialty Products



Laboratory Analytical Services

* Consumer Products
  * Method 310 Standard Operating Procedures

SAS01-Total Volatile Measurement of Consumer Products
SAS02-Ammonium Ion Using IC
SAS03-Karl Fischer (KF) Determination of Water
SAS04-Water Determination Using GC
SAS05-Determination of Compounds in Propellant by GC
SAS06-Qualitative Compound Determination by Headspace GC/MS
SAS07-Exempt and Non-Exempt Compound Determination by GC-FID
SAS09-Boiling Point Distribution Determination by GC
SAS12-Aromatic Compound Content Determination in Multi-Purpose Solvent and Paint Thinners

Laboratory Analytical Services

* Formaldehyde in Composition Wood Products
  * ED Purchases and Prepares Wood Samples
  * Samples Placed in Small Environmental Chambers
    * 1.0 Liter per Minute Flowrate
    * Sample Collected on Cartridge Media
  * Sample Extracted/Analyzed
    * High Performance Liquid Chromatography

Laboratory Analytical Services

* Sampler Evaluations
  * Carbon
  * Particulate
  * Ions
  * Acrylonitrile
* Special Studies
  * Manganese
  * VOC in New Automobiles

Clients and Collaboration

Clients and Collaboration

* Clients
  * U.S. EPA and Federal Agencies
  * Air Quality Surveillance Branch
  * ARB Divisions
  * California Districts
  * California Agencies
  * Other States
  * Universities and Academia
  * International
  * Industry
  * Public

Clients and Collaboration

* U.S. EPA
  * National Ambient Air Quality Standards
  * Air Quality System Database
  * Technical System Audits
  * Grant Funding for Laboratory Analyses
* Federal Agencies
  * National Air and Radiation Environmental Lab
  * U.S. Geological Survey

Clients and Collaboration

* Air Quality Surveillance Branch
  * Routine & Scheduled Monitoring
  * Special Projects and Studies
    * Pesticide Monitoring
    * Kettleman Hills
  * New Sampler Technologies
    * Fresno PM_{10} Speciation Study
    * Greenhouse Gases
    * Carbon Speciation Samplers
    * FRM vs FEM Bias Studies

Clients and Collaboration

* ARB Divisions
  * Air Quality Planning and Science Division
  * Transportation and Toxics Division
  * Enforcement Division
  * Research Division
  * Emission Compliance, Automotive Regulations and Science Division (formally MLD-South Labs)

Clients and Collaboration

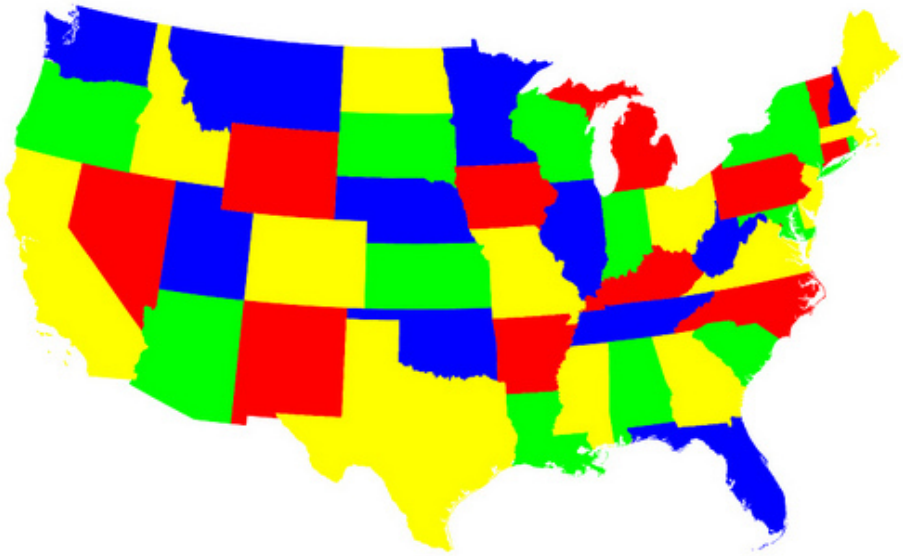
* California Districts
  * Laboratory Support and Services
  * Special Request Projects
    * Monterey Bay – Woodsmoke Study
    * San Joaquin Valley – Speciation and Filter Requests
    * San Luis Obispo – Oceano Dunes Speciation
    * Sacramento Metropolitan – Speciation/Toxics Requests
  * Back-up Laboratory Services

Clients and Collaboration

* California Agencies
  * Department of Pesticide Regulation
  * Office of Environmental Health Hazard Assessment
  * Department of Toxic Substances Control
  * Department of Public Health
  * Department of Food and Agriculture
  * Governor's Office

Clients and Collaboration

* Other States
  * Oregon
  * West Virginia
  * Florida

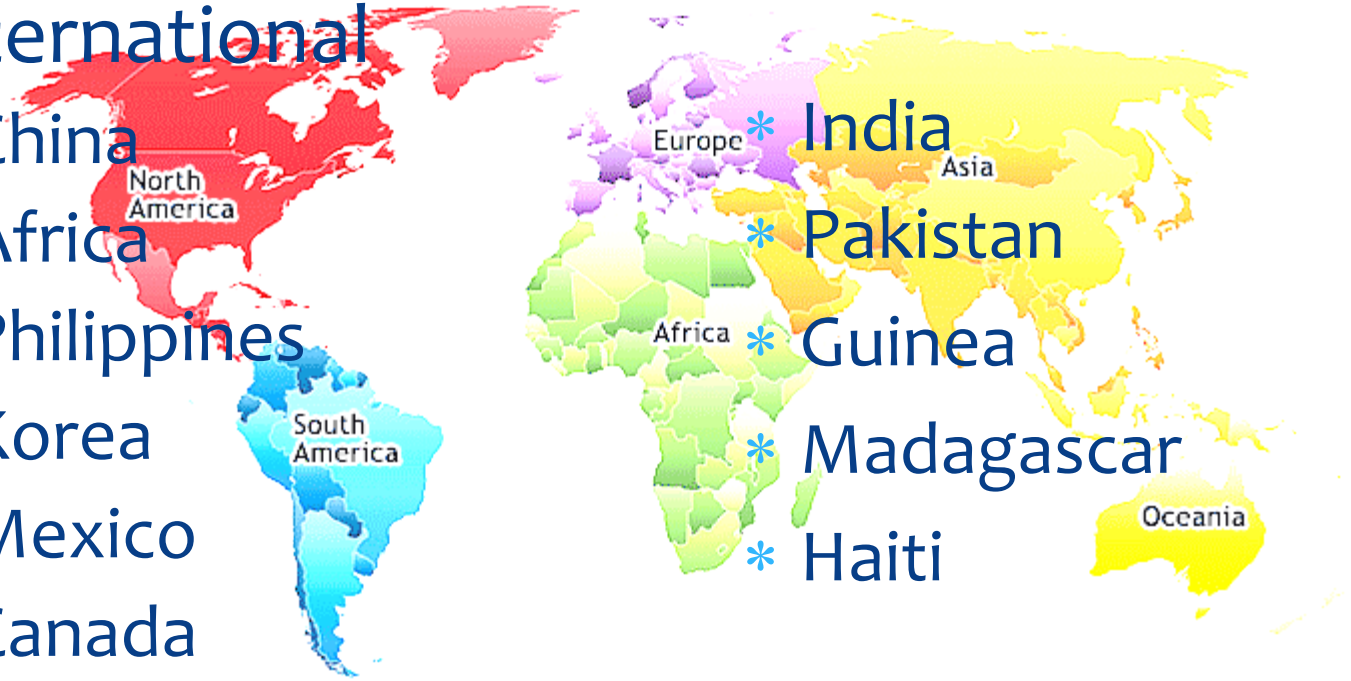


Clients and Collaboration

* Universities and Academia
  * West Virginia
  * UC Davis
  * UC Irvine
  * Cal Poly, San Luis Obispo
  * UC Riverside
  * UC San Francisco
  * Colorado State
  * UC San Diego

Clients and Collaboration

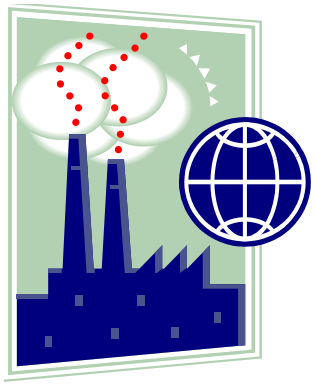
* International
  * China
  * Africa
  * Philippines
  * Korea
  * Mexico
  * Canada



* India
* Pakistan
* Guinea
* Madagascar
* Haiti

Clients and Collaboration

* Industry
  * Division of Oil, Gas, and Geothermal Resources
  * Southwest Research Institute
  * Desert Research Institute
  * Eurofins Air Toxics, Inc.
  * Geysers Air Monitoring Program



Analytical Data Quality

Accurate and defensible analytical data

Analytical Data Quality

* Data Quality Objectives
  * Code of Federal Regulations
  * California Health and Safety Code
  * National and State Ambient Air Quality Standards
  * Client Specific Limits of Quantitation (LOQ)
  * American Society for Testing and Materials
  * Good Laboratory Practices

Analytical Data Quality

* ARB's Quality Management Plan
  * Quality Control (QC) Manual
    * Detailed QC Policies and Procedures for Data:
      * Verification
      * Validation
  * Standard Operating Procedures (Volume III)
    * Analytical Method Specific Details to Ensure Data:
      * Accuracy
      * Precision
      * Completeness
  * Laboratory Information Management System (LIMS)

Analytical Data Quality

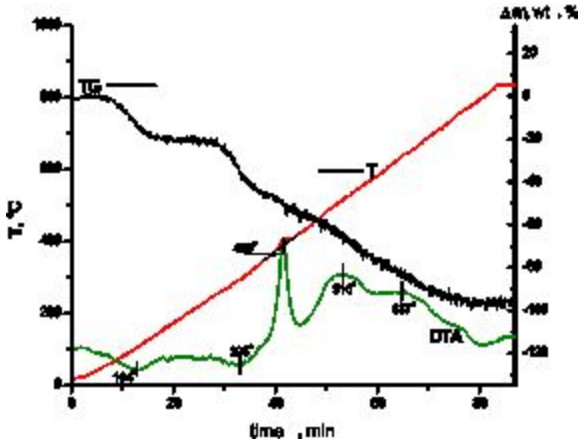
* Analytical Data Quality Process
  * Sample Management
  * Sample Extraction
  * Sample Analysis
  * Report Generation
  * Data Review and Approval
  * Data Released to Clients

Analytical Data Quality

* Sample Management
  * Media Preparation
  * Shipping/Receiving
  * Field Data Sheet/Chain of Custody Review
    * Accuracy
    * Completeness
    * Verification
  * LIMS Sample Log-In with Field Data
  * Internal Chain of Custody

Analytical Data Quality

* Sample Extraction/Analysis
  * Laboratory Blanks
  * Instrument Calibration
  * Control and Check Standards
  * Duplicate and Replicate Analyses
  * Instrument Maintenance
  * All Data Transferred to LIMS



Analytical Data Quality

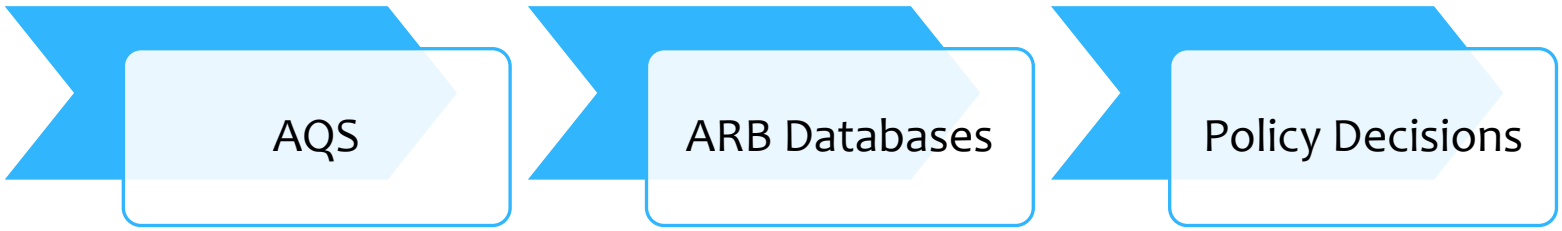
* Data Report Generated from LIMS
  * Method Specific Cover Page
  * Analytical Data Results (calculated and raw)
  * Quality Control Details (calibrations, controls, etc.)
  * Analytical Run Sequence
* Data Review and Validation
  * Analyst/Peer Review
  * Management Approval
* Validated Data Submitted to AQS or Clients

Analytical Data Quality

* Timeliness
  * 45 Day Turn Around Time from Month/Quarter
    * Receive All Samples
    * Extract/Analyze Samples with QC
    * Internal Report Generation
    * Review/Validate Data Package
    * Submit Validated Data to AQS
  * Collaborative Effort
    * Field and Laboratory Staff

How the Data are Used

How the Data are Used



How the Data are Used

* State Implementation Plans
* Air Quality Standard Attainment
* Emissions Inventory/Reductions
* Air Quality Modeling
* Control Technologies
* Regulatory Impact Evaluation
* Research and Development
* Public Health Risk Assessments
* Urban Planning
* Public Policy

Conclusion

Conclusion

* Data Are Not Just Numbers
  * Collection of All Our Efforts
  * Demonstrate Commitment to Data Quality
  * Willingness and Ability to Measure Air Quality Accurately
    * Meet Federal/State Requirements
    * Protect Public Health
  * Time Intensive Process
  * Collaborative Clients


Questions