Advanced Technology Systems, Inc.

Database and Analytical Tool Development for the Management of Data Derived from US DOE (NETL) Funded Fine Particulate ($PM_{2.5}$) Research

Prepared for:

09.25.2002

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Pittsburgh, PA 15238
(412) 967-1900
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In Conjunction With

OHIO UNIVERSITY 1804

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Project Objectives

Primary objective is to develop a comprehensive, computer-based system for:

- Integrating the ambient air quality data being collected under multiple on-going DOE-sponsored monitoring programs in the Upper Ohio River Valley region (UORV)
- Creating a publicly-available tool for accessing, displaying, analyzing and interpreting these air quality data

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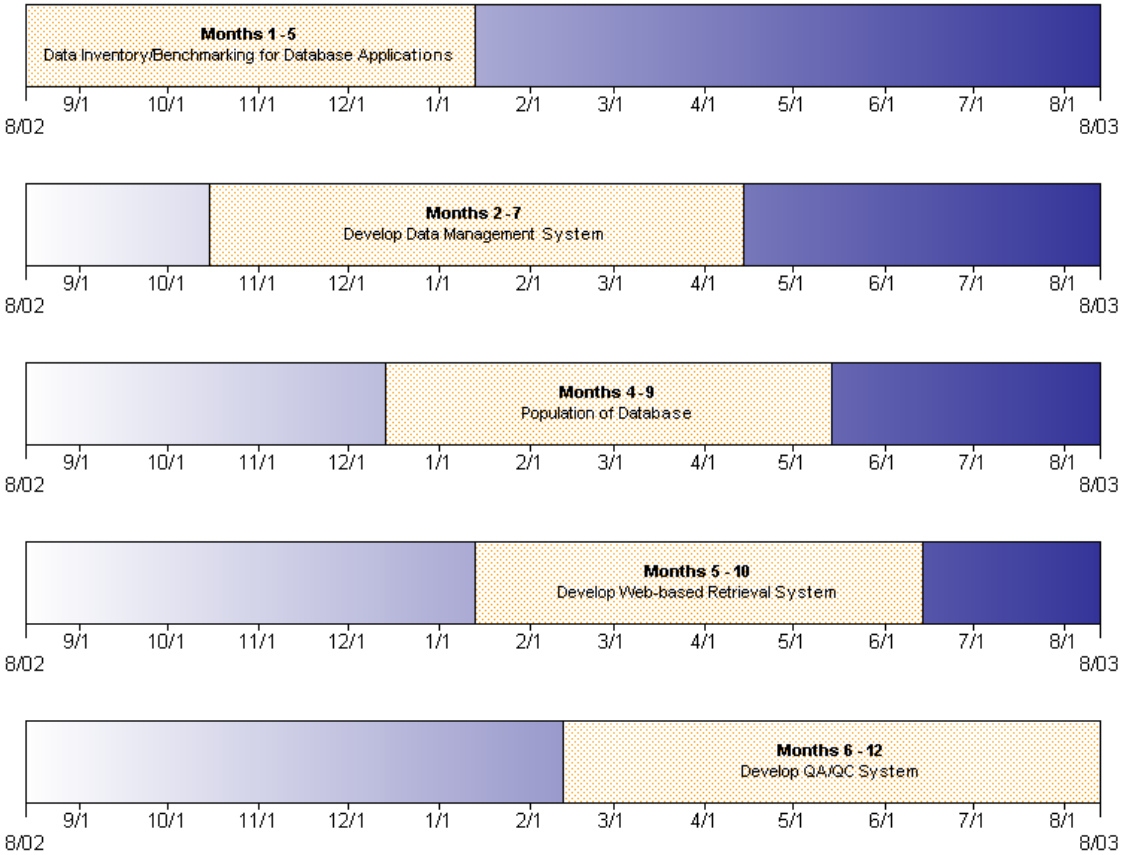
Year One At a Glance



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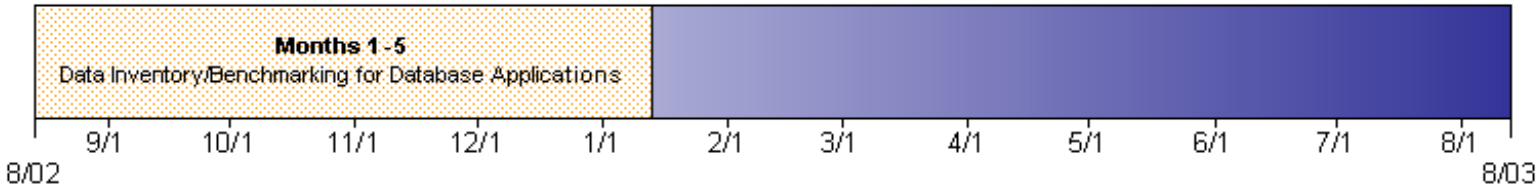

Data Inventory/Benchmarking

- Gain useful information regarding existing efforts already underway
- Determine what data has been collected
- Determine data set formats
- Examine data collection/generation procedures

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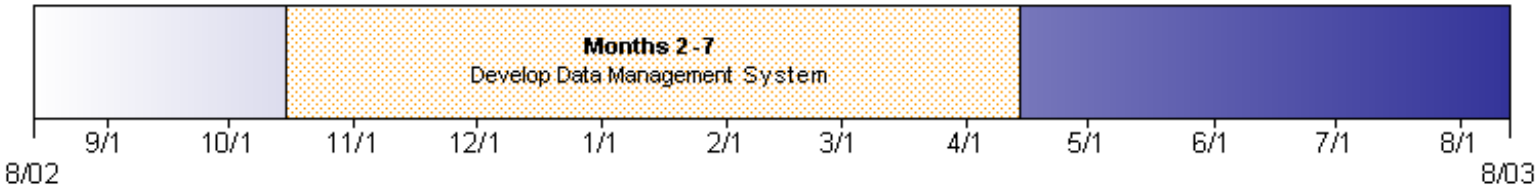

Develop Data Management System (DMS)

- Allow for remote management of DMS
- Decrease expected operational costs associated with on-site management
- Web-based interface to manage archiving and retrieving data sets
- Primary site at Ohio University, mirrored at *ATS*

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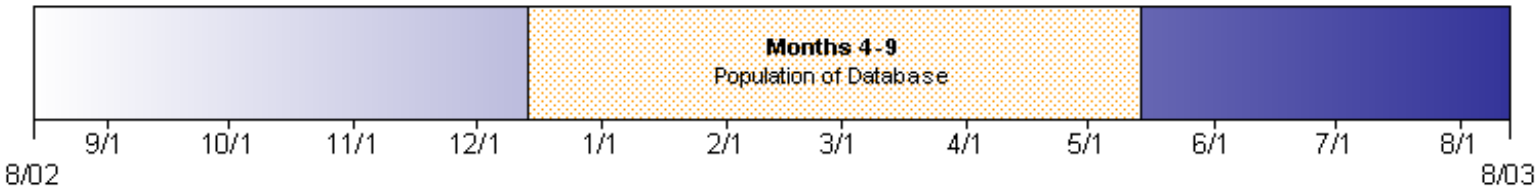

Population of Database

- Allow for remote data uploading to primary server
- Location-based authentication model
- Standardize data format requirements
- Allow for automated data uploads from collection sites

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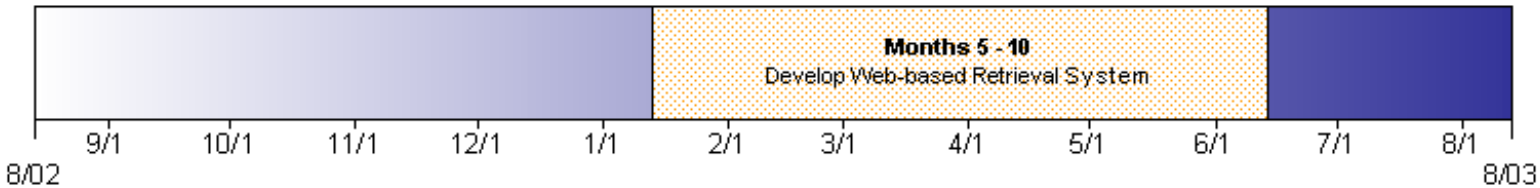

Web-Based Retrieval System

- Provide mechanisms for data sets to be retrieved from database
- Standardize output formats
- User-based authentication model

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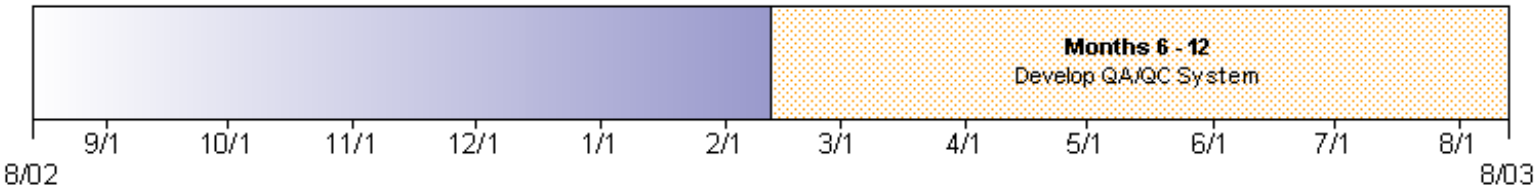

Develop QA/QC System

- All procedures thoroughly documented
- Screening system algorithms for data quality
- Concurrent Versioning System (CVS) repository for source code control/review

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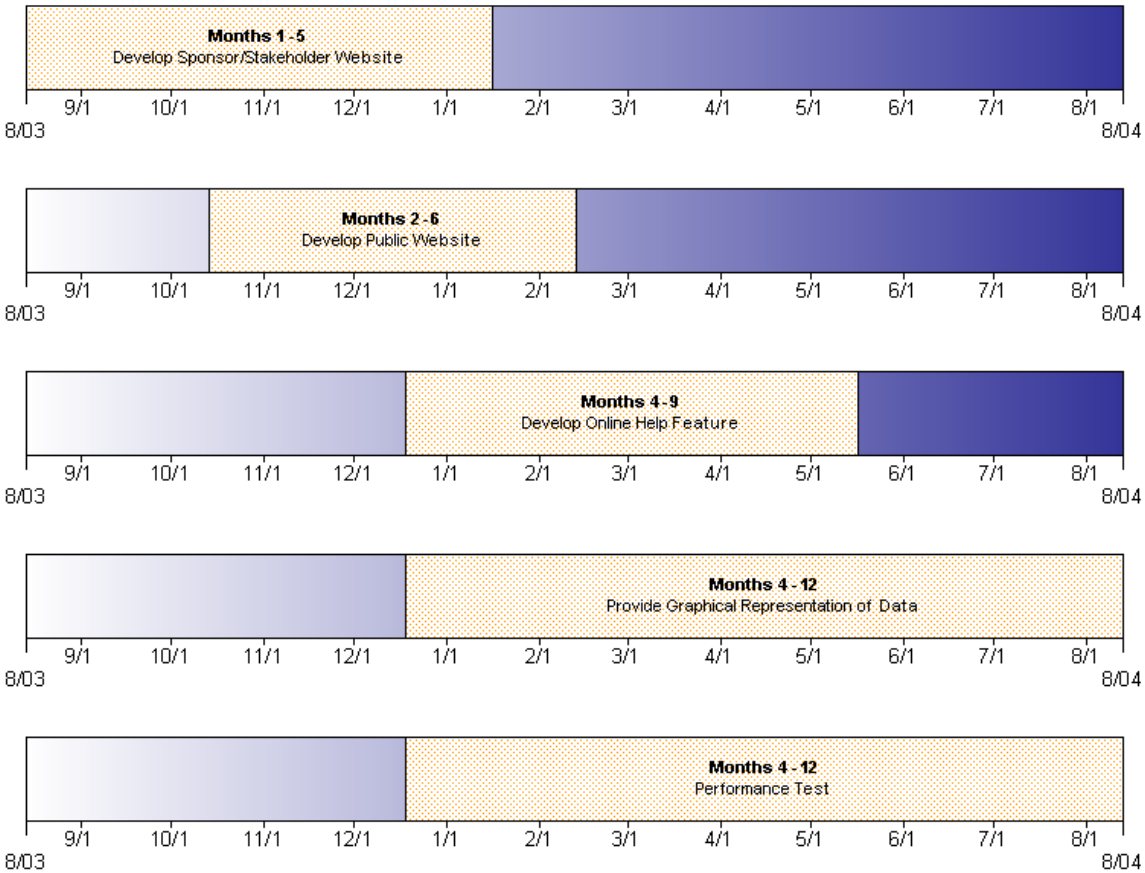
Year Two At a Glance



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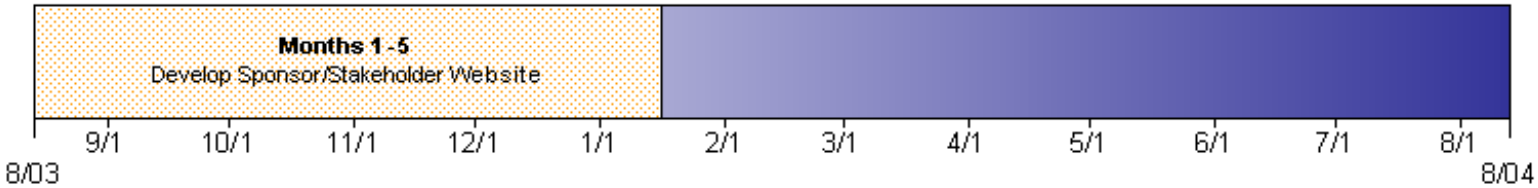

Develop Sponsor/Stakeholder Website

- Dynamic charting capabilities
- Trend analysis
- Back trajectory analysis
- Online point source modeling capabilities
- Statistical analysis of pollutant profiles and distributions
- Meteorological evaluations

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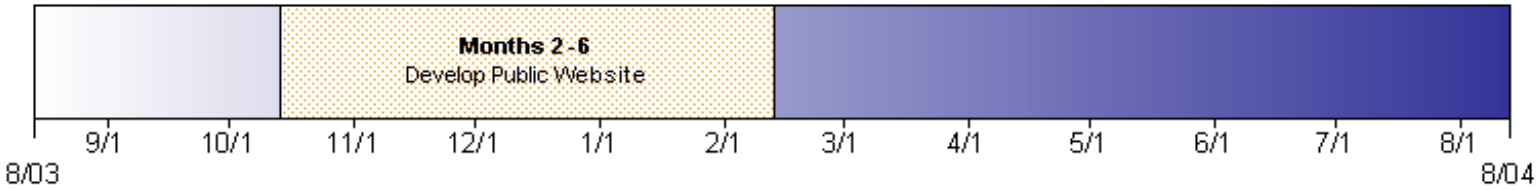

Develop Public Website

- Backbone of the public outreach system
- Designed as an information/decision support center
- Provide clear and concise data summaries from the monitoring programs
- Easy-to-understand graphical representations of data sets
- Reviewed continuously by environmental and community representatives prior to official launch

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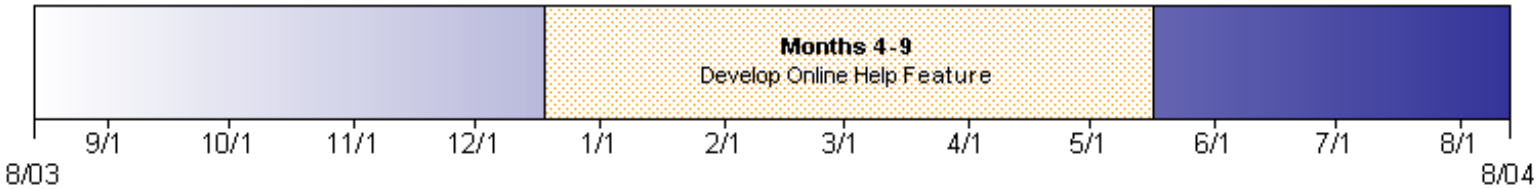

Develop Online Help Feature

- Support both Sponsor/Stakeholder and Public Websites
- Interactive system to provide depth, understanding and context to environmental data sets
- Assist user at any level of scientific background in interpretation of data

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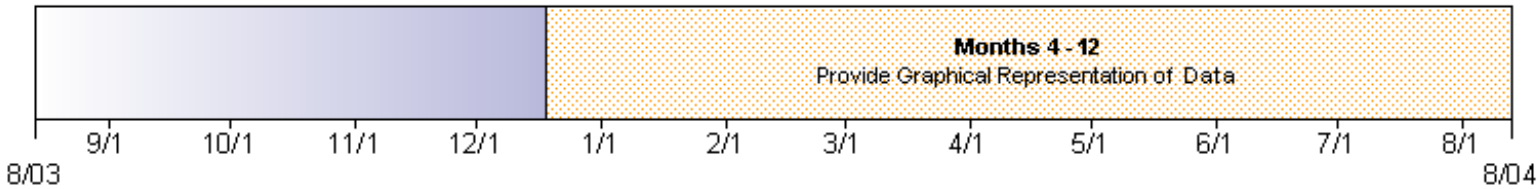

Provide Graphical Representation of Data

- Interactive mapping
- Linkages to Federal and regional efforts such as LADCO and EPA/OAQPS ozone-mapping projects
- Point and click display of pollutant concentrations as defined by the pollutant isopleths
- Historical trends in air pollution
- Population and potential health impacts of air quality

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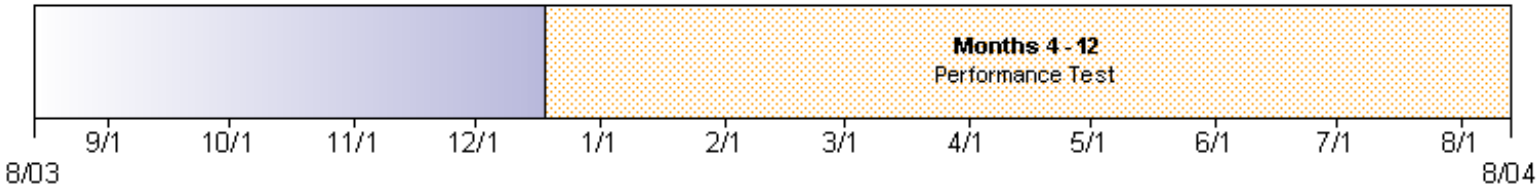

Performance Test

- Beta testing period to find and replace faulty source code
- Thorough source code reviews by team members
- Thorough testing to ensure project objectives have been met
- May require revisiting and reworking original designs
- Ongoing exercise in Phase II of this project

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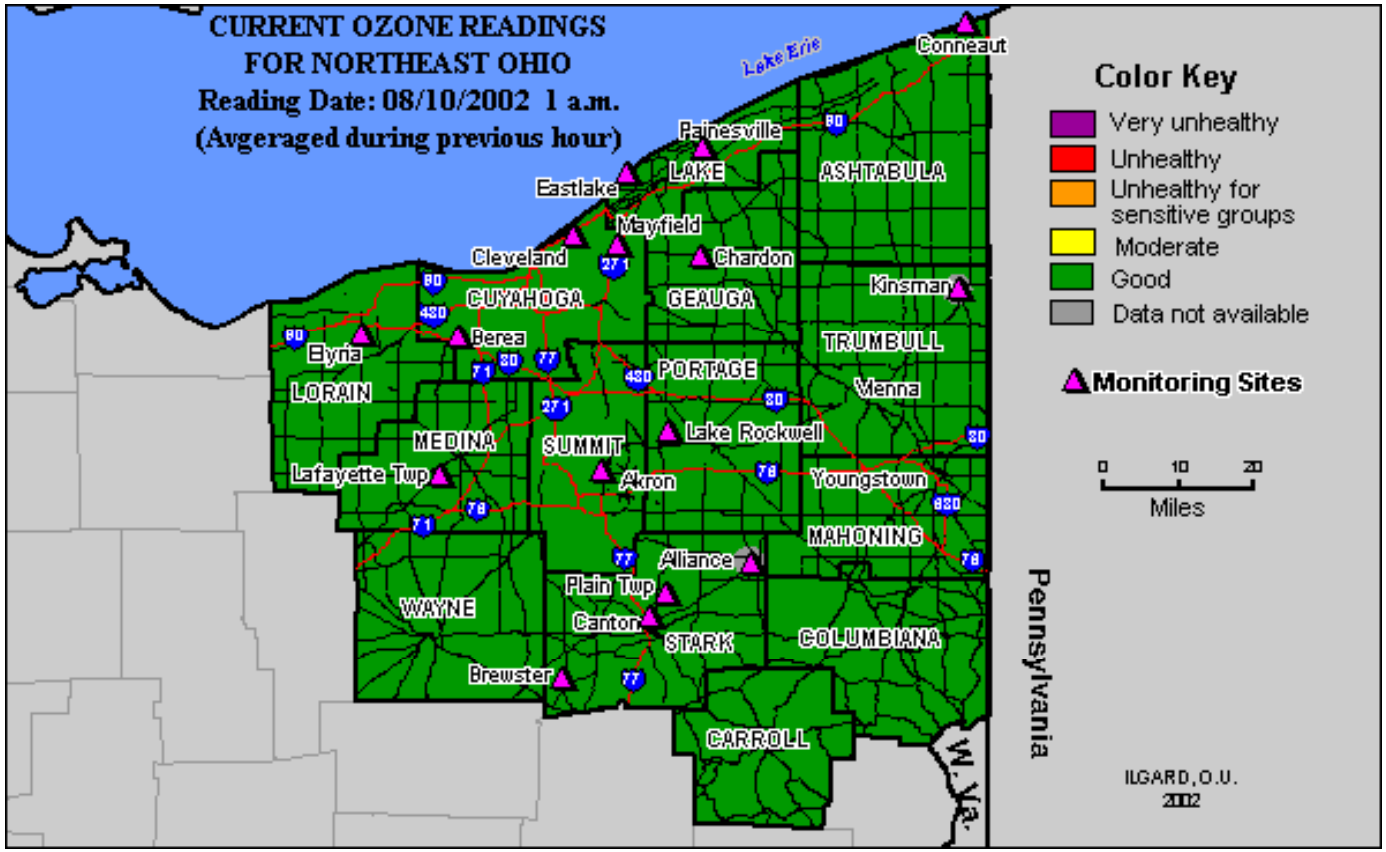

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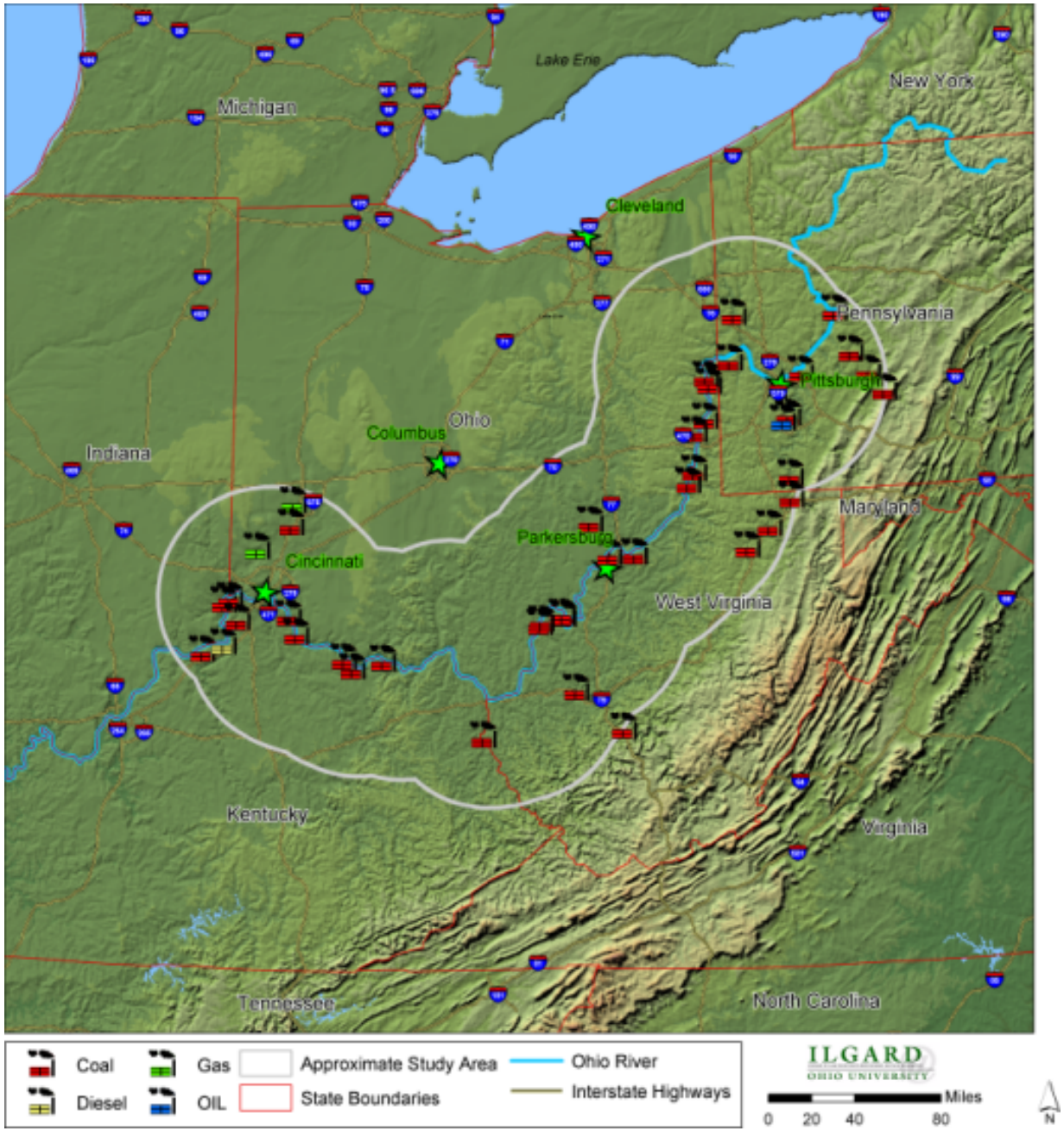

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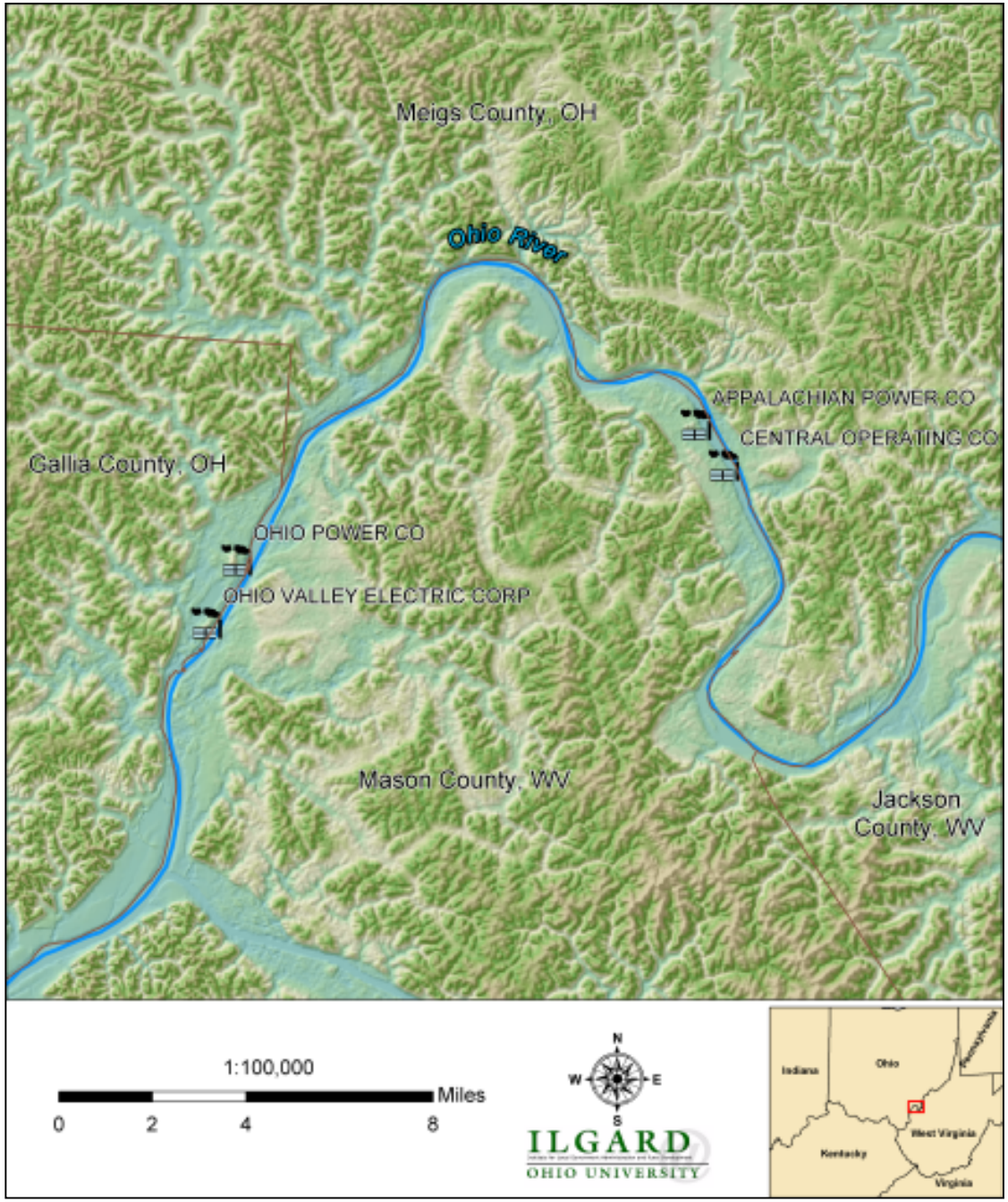

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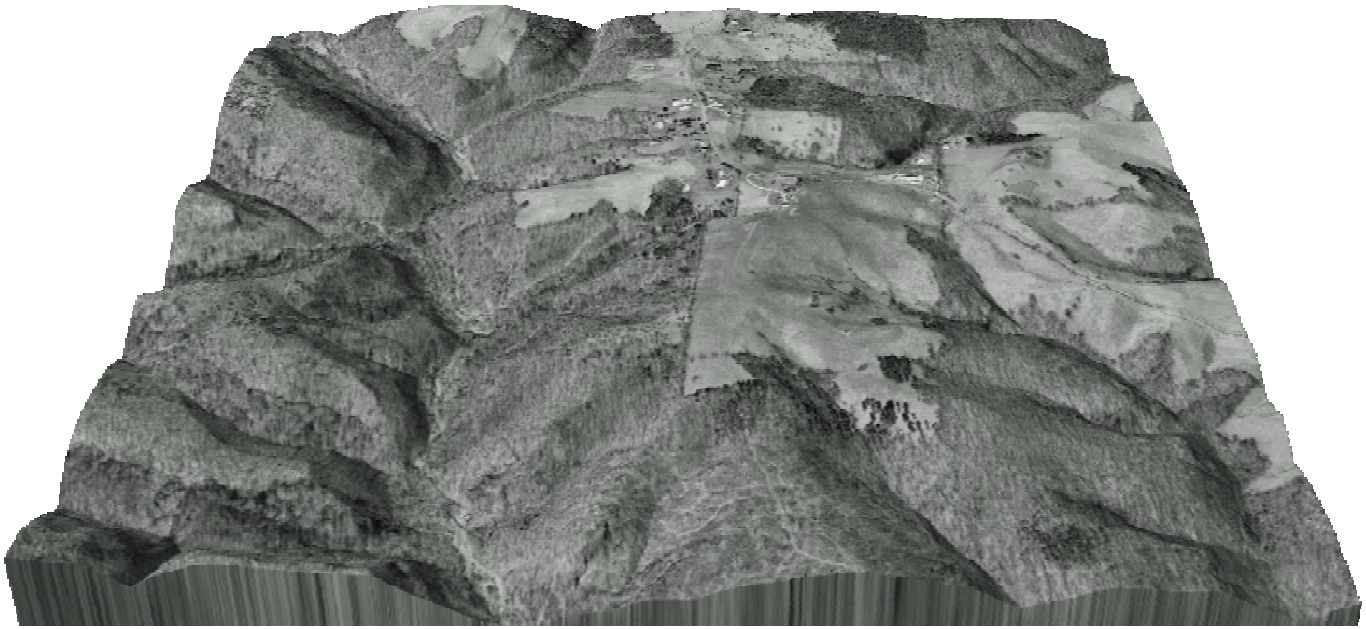
3D Imaging and Mapping



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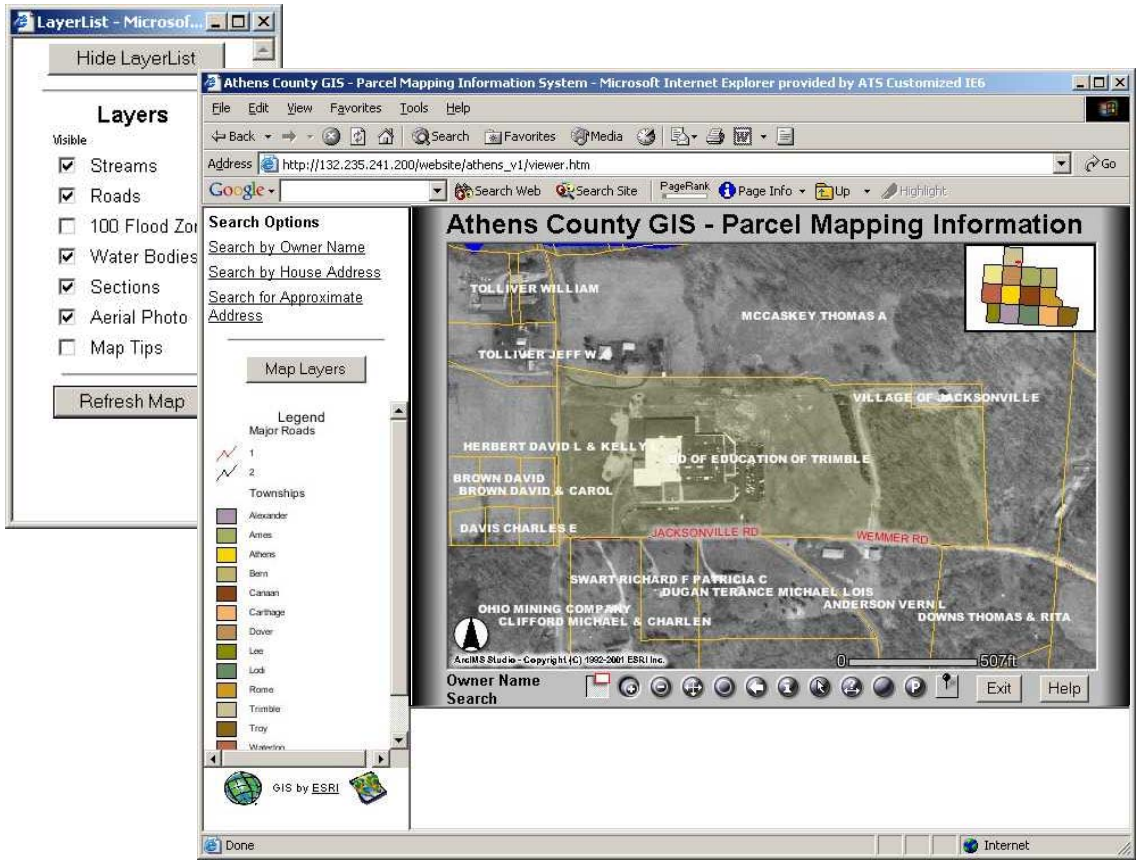

ESRI ArcIMS Online GIS Application

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Data - Microsoft Internet Explorer

File Edit View Favorites Tools Help

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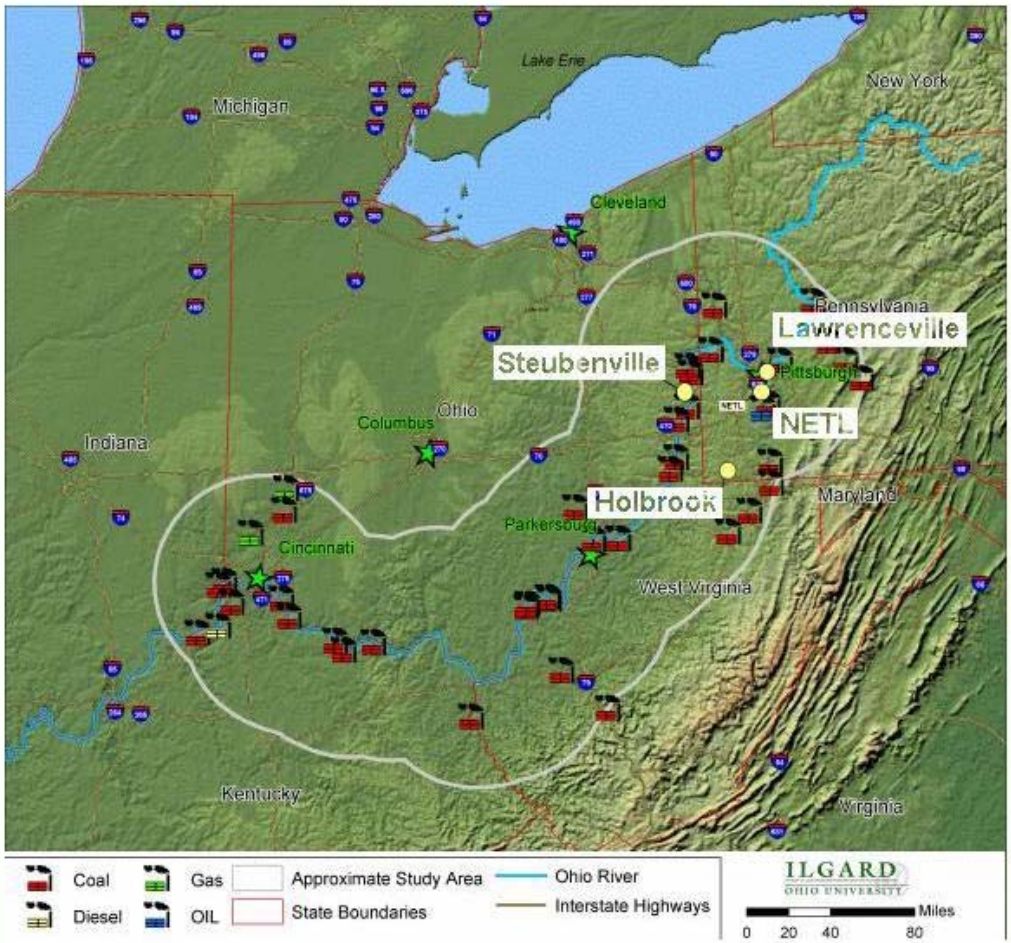
- UORVP Air Quality Data Analysis Project

The map below highlights the Upper Ohio River Valley Project air quality monitoring sites. You can obtain data and analysis by clicking the yellow dot for each site.



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Pollution Chart for Holbrook - Microsoft Internet Explorer

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- **Steubenville**

Monitor Name	Steubenville	**County**	Jefferson, OH
Latitude	40°36'17"	**Longitude**	80°61'47"
Note	This site is located at an elevation of 110m above the river.		
	The region from Steubenville OH, south to Moundsville WV contains several large point sources, including coal-fired power plants, steel mills and coke facilities.		
	Many of these point sources are in the Ohio River Valley close to Steubenville.		

- **Sample Analysis Type**

Select analysis type: Trajectory [Get Result]

Trajectory
Cluster
Pollution Rose

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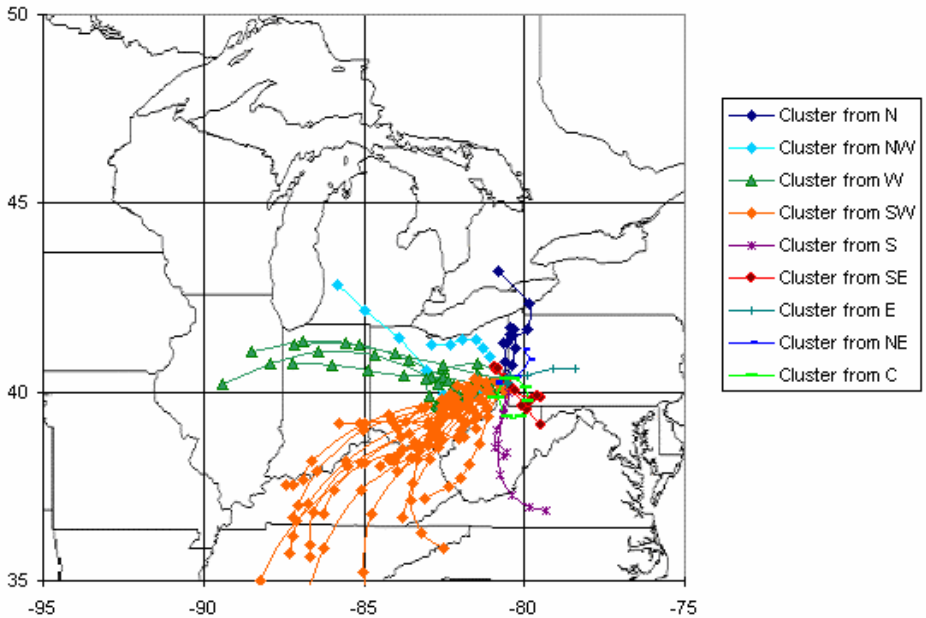
- **Trajectory Analysis for the Steubenville Site on High PM Days**

Criteria 24-hour average $PM_{2.5}$ > 25 μg/m^3

Period November 1999 ~ October 2000

Steubenville, 500m



Select analysis type: Trajectory Get Result

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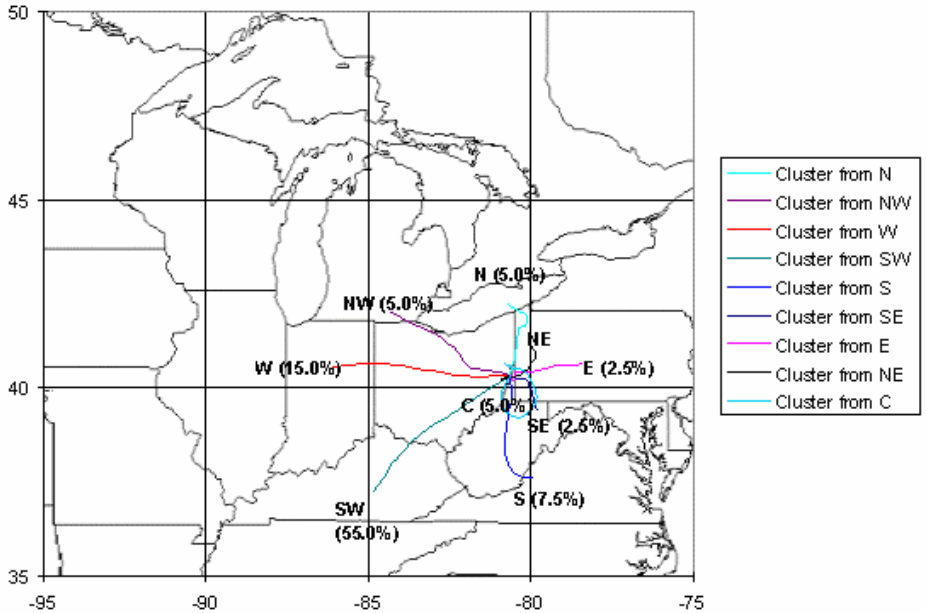
- **Cluster Analysis for the Steubenville Site on High PM Days**

Criteria 24-hour average $PM_{2.5}$ > 25 μg/m^3

Period November 1999 ~ October 2000

Steubenville



Select analysis type: Cluster Get Result

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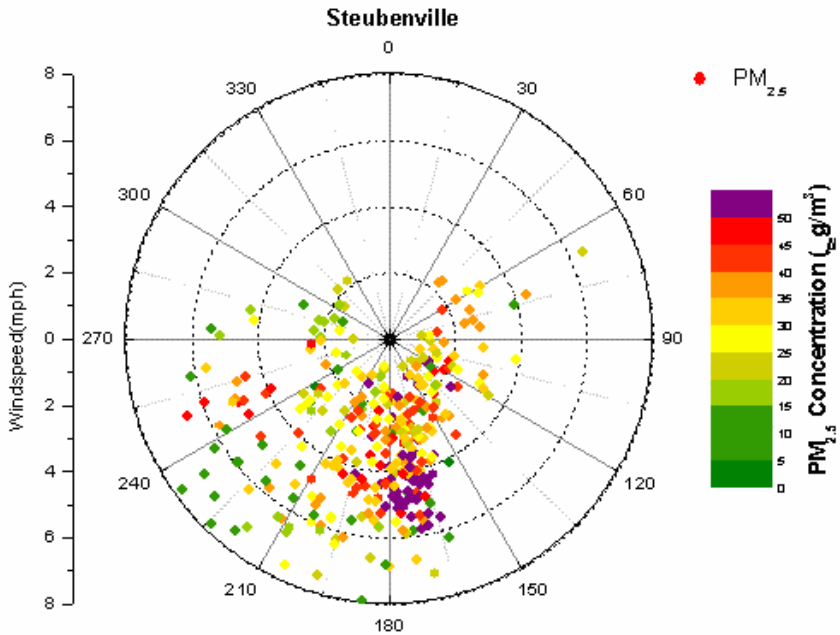
- **Pollution Rose Analysis for the Steubenville Site on High PM Days**

Criteria 24-hour average $PM_{2.5}$ > 25 μg/m^3

Period November 1999 ~ October 2000



High PM Days ($PM_{2.5}$>=25μg/m^3) in Nov. 1999 - Oct. 2000

Select analysis type: Pollution Rose Get Result

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ACKNOWLEDGEMENTS

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