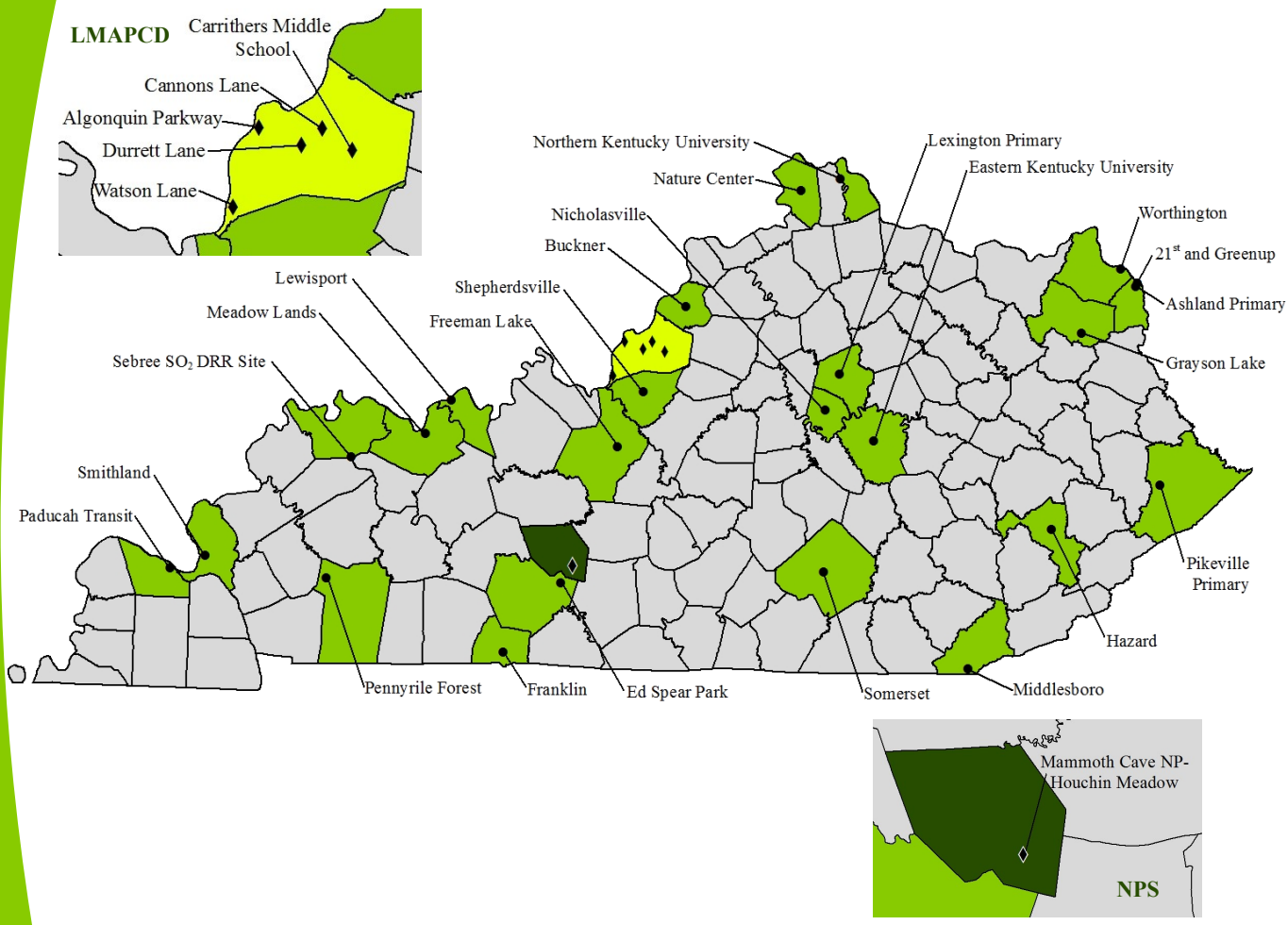
Kentucky
Annual Ambient Air Monitoring Network Plan 2025



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CERTIFICATION

By the signatures below, the Kentucky Division for Air Quality certifies that the information contained in this Surveillance Network document for sampling year 2025 is complete and accurate at the time of submittal to EPA Region 4. However, due to circumstances that may arise during the sampling year, some network information may change. A notification of change and a request for approval will be submitted to EPA Region 4 at that time, following a 30-day public comment period.

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PUBLIC NOTIFICATION AND COMMENT PERIOD

In accordance with 40 C.F.R. 58.10(a)(1), the Kentucky Energy and Environment Cabinet shall make the annual monitoring network plan available for public inspection for at least 30 days prior to submission to the US EPA. The annual monitoring network plan details the operation and location of ambient air monitors operated by the Kentucky Division for Air Quality (KDAQ), Louisville Metro Air Pollution Control District (LMAPCD), and the National Park Service (NPS).

ACRONYMS

AEM – Automated Equivalent Method

AQI – Air Quality Index

AQS – Air Quality System

ARM – Automated Reference Method

CBSA – Core-Based Statistical Area

CSA – Combined Statistical Area

CO – Carbon Monoxide

DRR – Data Requirements Rule

FEM – Federal Equivalent Method

FRM – Federal Reference Method

KDAQ – Kentucky Division for Air Quality

LMAPCD – Louisville Metro Air Pollution Control District

MSA – Metropolitan Statistical Area

NAAQS – National Ambient Air Quality Standards

NAMS – National Air Monitoring Stations

NAREL– National Air and Radiation Environmental Laboratory

NATTS – National Air Toxics Trends Stations

NIST– National Institute of Standards and Technology

NO_2 – Nitrogen Dioxide

NPS – National Park Service

O_3 – Ozone

PAH – Polycyclic Aromatic Hydrocarbons

Pb – Lead

PM – Particulate Matter

PTFE-Polytetrafluoroethylene

PWEI – Population Weighted Emissions Index

RA-40 – Regional Administrator 40

SAMWG – Standing Air Monitoring Working Group

SLAMS – State and Local Air Monitoring Stations

SO_2 – Sulfur Dioxide

SPM – Special Purpose Monitors

TBD – To Be Determined

U.S. EPA – United States Environmental Protection Agency

VOC – Volatile Organic Compounds

INTRODUCTION

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The Kentucky Division for Air Quality (KDAQ) has operated an air quality monitoring network in the Commonwealth since July 1967. The Louisville Metro Air Pollution Control District (LMAPCD), a local agency, has maintained a sub-network in its area of jurisdiction since January 1956. Since that time, the networks have been expanded in accordance with United States Environmental Protection Agency's (US EPA) regulations.

In October 1975, the US EPA established a work group to critically review and evaluate current air monitoring activities at that time. This group was named the Standing Air Monitoring Working Group (SAMWG). The review by the SAMWG indicated several areas where deficiencies existed which needed correction. The principal areas needing correction were: an excess of monitoring sites in some areas to assess air quality; existing regulations that did not allow for flexibility to conduct special purpose monitoring studies; and data reporting that was untimely and incomplete. These deficiencies were primarily caused by a lack of uniformity in station locations and probe siting, sampling methodology, quality assurance practices, and data handling procedures.

In August 1978, recommendations developed by SAMWG, to remedy the deficiencies in the existing monitoring activities, were combined with the new requirements of Section 319 of the Clean Air Act. Section 319 provided for the development of uniform air quality monitoring criteria and methodology; reporting of a uniform air quality index in major urban areas; and the establishment of an air quality monitoring system nationwide which utilized uniform monitoring criteria and provided for monitoring stations in major urban areas that supplement state-monitoring. The combination of the recommendations and requirements were included in a proposed revision to air monitoring regulations.

In May 1979, air monitoring regulations were finalized by the US EPA requiring certain modifications and additions to be included in the State Implementation Plan for air quality surveillance. These regulations require each state to operate a network of monitoring stations designated as State and Local Air Monitoring Stations (SLAMS) that measure ambient concentrations of air pollutants for which standards have been established. The SLAMS designation contains provisions concerning the conformity to specific siting and monitoring criteria not previously required. The regulations also provide for an annual review of the monitoring network to insure objectives are being met and to identify needed modification.

The current overall network consists of 30 air monitoring stations, operated by KDAQ, LMAPCD, and the National Park Service (NPS). The Commonwealth's SLAMS air monitoring network monitors criteria pollutants for which the National Ambient Air Quality Standards (NAAQS) have been issued. In addition to a SLAMS network, KDAQ's air monitoring network includes special purpose monitors (SPM) for air toxics and meteorological data.

The annual monitoring network description, as provided for in 40 CFR Part 58.10, *Annual monitoring network plan and periodic network assessment*, must contain the following information for each monitoring station in the network:

1. The Air Quality System (AQS) site identification number for existing stations.

2. The location, including the street address and geographical coordinates, for each monitoring station.

3. The sampling and analysis method used for each measured parameter.

4. The operating schedule for each monitor.

5. Any proposal to remove or move a monitoring station within a period of eighteen months following the plan submittal.

6. The monitoring objective and spatial scale of representativeness for each monitor.

7. The identification of any site that is suitable for comparison against the $PM_{2.5}$ NAAQS.

8. The Metropolitan Statistical Area (MSA), Core-Based Statistical Area (CBSA), Combined Statistical Area (CSA), or other area represented by the monitor.

The following document constitutes the Kentucky ambient air monitoring network description and is organized into four main parts:

1. Station Description Format: An outline of the designations, parameters, monitoring methods, and the basis for site selection.

2. Network Summaries: Presenting the total number of sites and monitors in each region and for the state. Also included is a listing of all proposed changes to the current network.

3. Air Monitoring Station Description: Each air monitor station is described in detail as per the outline in (1) above.

4. Appendices: Additional information relating to the ambient air monitoring network.

Modification to the network as determined by an annual review process will be made each year to maintain a current network description document.

AIR MONITORING NETWORK SUMMARY

SUMMARY OF KDAQ NETWORK CHANGES 2025

During the 2025-2026 monitoring year, KDAQ will operate 67 instruments, including 1 meteorological station, located at 24 ambient air monitoring sites in 23 Kentucky counties. LMAPCD will operate an additional 34 instruments, including 5 meteorological stations, in Jefferson County. When combined with the air monitoring site operated by the National Park Service (NPS) at Mammoth Cave National Park, the total ambient air monitoring network will consist of 103 instruments, including 7 meteorological stations, located at 30 sites across 25 counties of the Commonwealth.

KDAQ proposes no changes to the ambient air monitoring network. Changes to the LMAPCD network are detailed in Appendix E.

KDAQ is reapplying for existing waivers at the Hazard (21-193-0003) and Somerset (21-199-0003) sites. These waivers were originally included in the 2023 Network Plan and approved by EPA. Waiver requests can be found in Appendix K. KDAQ is also working on updating the Memoranda of Agreement (MOA) with surrounding states. The Clarksville, TN-KY agreement has been updated to include the change from Hopkinsville (21-047-0006) to Pennyrile Forest (21-047-0007). Current MOAs can be found in Appendices B-D.

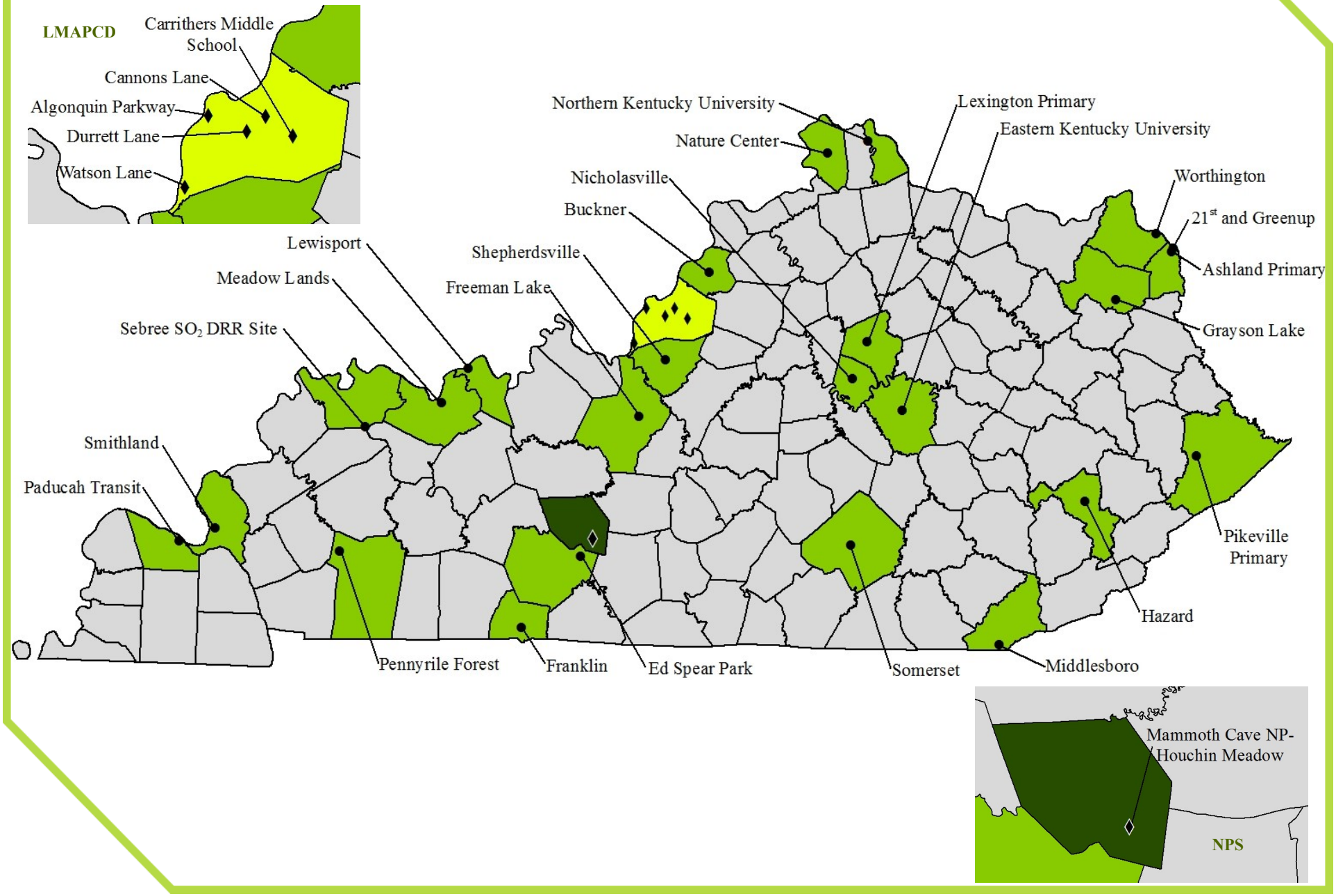
No changes to are being proposed.

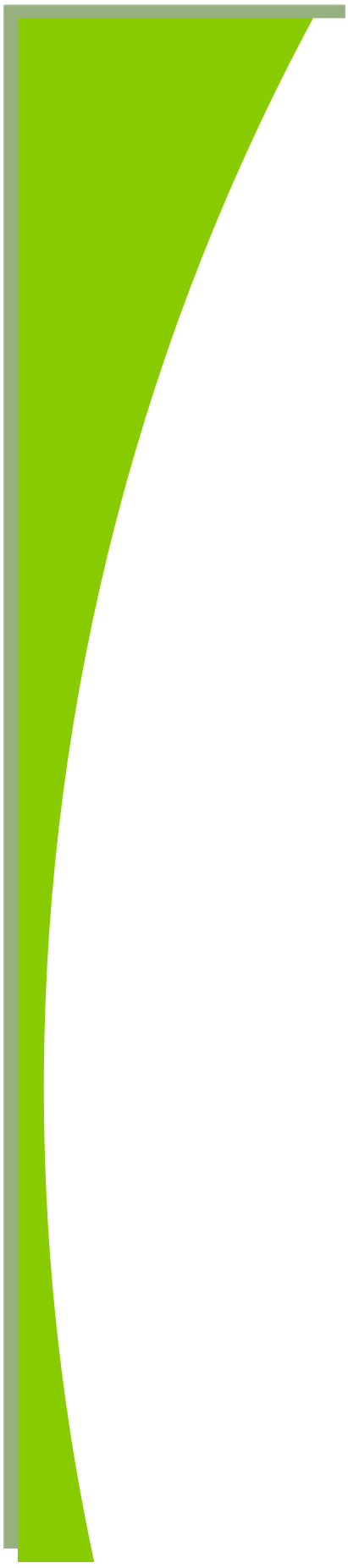
2025 AIR MONITORING STATIONS SUMMARY

Metropolitan Statistical Area	Site Count	Filter Based $PM_{2.5}$	Continuous $PM_{2.5}$	PM_{10}	Continuous PM_{10}	SO_2	NO_2	NO_y	CO	O_3	Pb	VOC	Carbonyl	PAH	$PM_{2.5}$ Speciation	Carbon Speciation	Black Carbon	H_2S	RadNet	Met
Bowling Green, KY	2		$2^{S,C,i}$							$2^{i,Max}$										1
Cincinnati-, OH-KY-IN	2	2^{c}	$1^{i,S,C}$			1	1			2^{i}										
Clarksville, TN-KY	1		$1^{i,X,S}$							1^{i}										
Elizabethtown, KY	1	1^{C}	$1^{i,S}$							$1^{i,Max}$										
Huntington-Ashland, WV-KY-OH	4		$2^{i,S,X}$	$4^{C,m}$		2	1			$3^{i,Max}$		2^{D}	2^{D}	1						1
Lexington-Fayette, KY	2		$2^{i,S}$	1^{m}		2	1^{r40}			$2^{i,Max}$									1	
Louisville/Jefferson County, KY-IN	7	$2^{n,C}$	$5^{e,E,i,n,S}$		$2^{i,E}$	3^{i}	$2^{n,i}$	1	$2^{n,i}$	$6^{i,Max}$		2^{G}	1		1	1	1	1	1	5^{n}
Owensboro, KY	1		$1^{i,S}$			1	1^{i}			$1^{i,Max}$										
Paducah, KY-IL	2		$1^{i,S}$			1	1			$2^{i,M}$									1	
Micropolitan Statistical Area																				
Franklin, KY	1									1^{i}										
Henderson, KY	1					1^{DRR}														
Middlesborough, KY	1		$1^{i,S}$							1^{i}										
Pikeville, KY	1		$1^{i,S}$							1^{i}										
Richmond-Berea, KY	1										2^{C}									
Somerset, KY	1		$1^{i,S}$							1^{i}										
Not in a CBSA																				
Hancock County	1									1^{i}										
Perry County	1		$1^{i,S}$							1^{i}										
KDAQ Totals	24	3	15	5	0	8	5	0	0	21	2	2	2	1	0	0	0	0	2	1
LMAPCD Totals	5	2	5	0	2	3	2	1	2	4	0	2	1	0	1	1	1	1	1	5
NPS Totals	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Total Network	**30**	**5**	**20**	**5**	**2**	**11**	**7**	**1**	**2**	**26**	**2**	**4**	**3**	**1**	**1**	**1**	**1**	**1**	**3**	**7**

Tallies are equal to the actual number of monitors in operation. Superscripts represent additional information about the network.; r40=RA-40 Monitor; Max= Maximum O_3 Concentration Site; n=Near-Road Monitor; X= Regional $PM_{2.5}$ Transport or Background Monitor; S=Continuous PM T640; i=AQI Reported; m= PM10 Filter Analyzed for Metals; G=Continuous Auto-GC; C=Collocated Monitors ; D= Duplicate Channels; DRR= SO2 Data Requirements Rule Monitor; E= Continuous PM2.5-PM10 T640x-Coarse; (T640x samples for PM_{10}, $PM_{2.5}$ and PM $_{coarse}$ with a single monitor)

2025 Ambient Air Monitoring Network





STATION DESCRIPTION FORMAT

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AQS Site Identification Information

Pertinent, specific siting information for each site and monitor is stored in the US EPA's AQS data system. This information includes the exact location of the site, local and regional population, description of the site location, monitor types, and monitoring objectives. This site and monitor information is routinely updated whenever there is a change in site characteristics or pollutants monitored.

Network Station Description

The network station descriptions contained in this document include the following information:

1. Site Description

Specific information is provided to show the location of the monitoring equipment at the site, the CBSA in which the site is located, the AQS identification number, the GPS coordinates, and the conformance of monitors and monitor-probes to siting criteria.

2. Date Established

The date that each existing monitoring station was established is shown in the description. For proposed air monitoring stations, the date that the station is expected to be in operation is included in the annual Summary of Network Changes.

3. Site Approval Status

Each monitoring station in the existing network has been reviewed with the purpose of determining whether it meets all design criteria for inclusion in the SLAMS network. Stations that do not meet the criteria will either be relocated in the immediate area or, when possible, re-sited at the present location. KDAQ may also seek an exemption from certain criteria from the US EPA.

4. Monitoring Objectives

The monitoring network was designed to provide information to be used as a basis for the following actions:

(a) To determine compliance with ambient air quality standards and to plan measures in order to attain these standards.

(b) To activate emergency control procedures in the event of an impending air pollution episode.

(c) To observe pollution trends throughout a region including rural areas and report progress made toward meeting ambient air quality standards.

(d) To provide a database for the evaluation of the effects of air quality on population, land use, and transportation planning; to provide a database for the development and evaluation of air dispersion models.

5. Monitoring Station Designations, Monitor Types, and Network Affiliations

The Annual Network Surveillance document must describe the types of monitors that are used to collect ambient data. Most monitors described in the air quality surveillance network are designated as SLAMS, but some monitors fulfill other requirements. Additionally, monitors

may be associated with additional networks beyond the state air program or may be used to fulfill multiple network design requirements.

State and Local Air Monitoring Stations (SLAMS): Requirements for air quality surveillance systems provide for the establishment of a network of monitoring stations designated as SLAMS that measure ambient concentrations of pollutants for which standards have been established. These stations must meet requirements that relate to four major areas: quality assurance, monitoring methodology, sampling interval, and siting of instruments.

Special Purpose (SPM and SPM-Other): Not all monitors and monitoring stations in the air quality surveillance network are included in the SLAMS network. In order to allow the capability of providing monitoring for complaint studies, modeling verification and compliance status, certain monitors are reserved for short-term studies and are designated as either Special Purpose Monitors (SPM) or Other Special Purpose Monitors (SPM-Other).

NCore: NCore is a multi pollutant network that integrates several advanced measurement systems for particulates, pollutant gases and meteorology.

Air Quality Index (AQI): The AQI is a method of reporting that converts pollutant concentrations to a simple number scale of 0-500. Intervals on the AQI scale are related to potential health effects of the daily measured concentrations of major pollutants. AQI reporting is required for all metropolitan statistical areas with a population exceeding 350,000. However, KDAQ provides this service to the general public for multiple areas within the state. KDAQ prepares the index twice daily for release to the public from the pollutant data reported from the selected sites in locations across Kentucky. The ambient air data establishing the AQI is subject to quality assurance procedures and is not considered official.

Emergency Episode Monitoring (Episode): Regulations provide for the operation of at least one continuous SLAMS monitor for each major pollutant in designated locations for emergency episode monitoring. These monitors are placed in areas of worst air quality and provide continual surveillance during episode conditions.

EPA: Monitor operated by the EPA or an EPA contractor. Monitors may be eligible for comparisons against the NAAQS and are typically a part of the CASTNET network.

Non-EPA Federal: Monitors operated by Federal agencies outside of the US EPA (such as the National Park Service) are designated as Non-EPA Federal monitors. These monitors are typically used for special studies, but the data may also be eligible for comparisons against the NAAQS.

Population Weighted Emissions Index (PWEI): On June 22, 2010, the US EPA released a new SO_2 Final Rule and a set of monitoring requirements. The requirements use a Population Weighted Emissions Index (PWEI) that is calculated for each Core-Based Statistical Area (CBSA). The PWEI is calculated by multiplying the population of each CBSA and the total amount of SO_2, in tons per year, that is emitted within the CBSA based upon county level data from the National Emissions Inventory (NEI). The result is then divided by one million to provide the PWEI value, which is expressed in a unit of million persons-tons per year. PWEI requirements technically apply to the MSA and are not monitor specific. Any SO_2 used to fulfill MSA PWEI requirements must first and foremost be designated as SLAMS.

Regional Administrator 40 (RA-40): On February 9, 2010, the US EPA released a new NO_2 Final Rule and a new set of monitoring requirements. Under the new monitoring regulations, the EPA Regional Administrator must collaborate with agencies to establish or designate 40 NO_2 monitoring locations, with a primary focus on protecting susceptible and vulnerable populations. RA-40 NO_2 monitors are SLAMS monitors foremost.

Maximum Ozone Concentration: Each Metropolitan Statistical Area (MSA) must have at least one ozone monitor designated to record maximum expected ozone concentrations. These monitors are first and foremost SLAMS (or SLAMS-like) monitors.

6. Monitoring Methods

All sampling and analytical procedures used for NAAQS compliance in the air-monitoring network conform to Federal reference (FRM), alternate (FAM), or equivalent (FEM) methods. In case there is no federal method, procedures are described in the Kentucky Air Quality Monitoring and Quality Assurance Manuals.

(a) Particulate Matter 10 Microns in Size (PM_{10})

All PM_{10} samplers operated by KDAQ are certified as either FRM or FEM samplers and are operated according to the requirements set forth in 40 CFR 50 and 40 CFR 53. Intermittent samplers typically collect a 24-hour sample every sixth day on 46.2 mm PTFE filters. However, certain sites may collect samples more frequently to address local air quality concerns. Filters are sent to a contract laboratory, where they are weighed before and after a sample run. The gain in weight in relation to the volume of air sampled is calculated in micrograms per cubic meter (ug/m^3). The PTFE filters are to be equilibrated before each weighing for a minimum of 24 hours at a 20-23 degrees C mean temperature and a 30-40% mean relative humidity.

For continuous PM_{10} monitoring, LMAPCD uses Teledyne API T640x for PM_{10} NAAQS compliance and PM_{coarse} monitoring. TAPI T640x monitors collect $PM_{2.5,}$ PM_{10}, and $PM_{10\text{-}2.5\ (coarse)}$ data continuously via the principle of broadband particle-scattering spectroscopy. During sampling, ambient air is pulled into an inlet at a rate of 16.7 lpm and through a sample conditioner, prior to being introduced to a particle sensor equipped with a polychromatic (broadband) LED. Particles in the sample reflect light from the LED, which is measured by the analyzer and used to calculate the particle-mass of the sample.

(b) Particulate Matter 2.5 Microns in Size ($PM_{2.5}$)

The Division currently operates continuous Teledyne-API (TAPI) T640 continuous $PM_{2.5}$ spectroscopy monitors and manual intermittent samplers for monitoring particulate matter 2.5 microns in size ($PM_{2.5}$). All $PM_{2.5}$ samplers and monitors operated by KDAQ are certified as either reference or equivalent methods. All FRM manual intermittent samplers are operated per the requirements set forth in 40 CFR 50, Appendix L. Samples are collected on 46.2 mm PTFE filters over a 24-hour sampling period, with airflow maintained at 16.7 liters per minute. Filters are sent to a contract laboratory, where they are weighed before and after a sample run. The gain in weight in relation to the volume of air sampled is calculated in micrograms per cubic meter (ug/m^3). Samples must be retrieved within 177 hours of the end of the sample run and are kept cool (4 degrees C or cooler) during transit to the contract laboratory. The PTFE filters are to be equilibrated before each weighing for a minimum of 24 hours at a controlled atmosphere of 20-23 degrees C mean temperature and 30-40% mean relative humidity. Filters must be used within thirty days of initial weighing. Filters must be re-weighed within thirty days of the end of the sample run and must be kept at 4 degrees C or cooler.

TAPI T640 monitors collect $PM_{2.5}$ data continuously via the principle of broadband particle-scattering spectroscopy. The TAPI T640 is designated as a FEM for $PM_{2.5}$. During sampling, ambient air is pulled into an inlet at a rate of 5.0 lpm and through a sample conditioner, prior to being introduced to a particle sensor equipped with a polychromatic (broadband) LED. Particles in the sample reflect light from the LED, which is measured by the analyzer and used to calculate the particle-mass of the sample.

LMAPCD uses Teledyne API T640 and T640x for NAAQS compliance monitoring. Continuous $PM_{2.5}$ T640s are used to provide 24-hour daily reporting for the AQI. The data obtained from continuous FEMs may or may not be used for comparison to the NAAQS. A statement on the use of continuous FEM $PM_{2.5}$ monitors is included in the appendices of this document.

(c) **$PM_{2.5}$ Speciation and Carbon Speciation Sampling and Analysis**

In addition to operating $PM_{2.5}$ samplers that determine only $PM_{2.5}$ mass values, LMAPCD also operates $PM_{2.5}$ speciation samplers that collect samples that are analyzed to determine the chemical makeup of $PM_{2.5}$. Samples are collected on a set of two filters, one comprised of Teflon and one comprised of nylon, over a 24-hour sampling period. The filters are composed of either Teflon or nylon in order to collect specific types of toxic pollutants. A second instrument collects a sample on a quartz filter over a 24-hour sampling period. The quartz filter is used to collect a speciated carbon sample.

After collection, the samples are shipped in ice chests to an EPA contract laboratory for analysis. At the laboratory, the samples are analyzed using optical and electron microscopy, thermal-optical analysis, ion chromatography, and x-ray fluorescence to determine the presence and level of specific toxic compounds. Sample results are entered in the AQS data system.

(d) **Sulfur Dioxide (SO_2)**

Instruments used to continuously monitor sulfur dioxide levels in the atmosphere employ the UV fluorescence method. The continuous data output from the instrument is transmitted by telemetry for entry into an automated central data system.

Calibration of these instruments is done dynamically using certified gas mixtures containing a known concentration of sulfur dioxide gas. This gas is then diluted in a specially designed apparatus to give varying known concentrations of sulfur dioxide. These known concentrations are supplied to the instruments, which are adjusted so that instrument output corresponds with the specific concentrations. Calibration curves are prepared for each instrument and each data point is automatically compared to this curve before entry into the data acquisition system.

(e) **Carbon Monoxide (CO)**

Continuous monitoring for carbon monoxide is performed by use of the non-dispersive infrared correlation method. Data is transmitted by telemetry for entry in an automated central data acquisition system.

Calibration of the instrument is performed periodically by using nitrogen or zero air to establish the zero baseline and NIST or NIST traceable gas mixtures of carbon monoxide in air. The span is checked daily using a certified mixture of compressed gas containing approximately 45 parts per million carbon monoxide.

(f) **Ozone (O_3)**

Ozone is monitored using the UV photometry methods. The continuous data output from the instrument is transmitted by telemetry for entry into an automated central data acquisition system.

Monitors are calibrated routinely using an ozone generator, which is calibrated using the ultra violet photometry reference method. Calibration curves are prepared for each instrument and each data point is automatically compared to this curve before entry into the data acquisition system.

(g) **Nitrogen Dioxide (NO_2)**

KDAQ uses the chemiluminescence method for monitoring the nitrogen dioxide level in the ambient air. The continuous data output from the instrument is transmitted by telemetry for entry into an automated central data acquisition system.

LMAPCD utilizes the Cavity-Attenuated Phase-Shift (CAPS) spectroscopy method as well as chemiluminescence to measure nitrogen dioxide and total reactive nitrogen (NO/NOy) respectively.

Calibration of these instruments is done dynamically using NIST certified gas mixtures of nitric oxide. Through the use of dilution apparatus, varying concentrations are produced and supplied to the monitors, thus producing a specific calibration curve for each instrument. Each data point is automatically compared to this curve before entry into the data acquisition system.

(h) **Lead (Pb)**

To determine lead concentrations, KDAQ uses high volume particulate samplers, which collect samples of suspended particulates onto 8 x 10 glass fiber filters. The samplers use a brushless motor and a critical flow orifice in order to achieve a sampling flow rate between 1.10 and 1.70 cubic meters per minute (m^3/min) over the course of 24 hours. Upon collection, the filters are sent to an US EPA certified laboratory for analysis. The sample filters are cut into strips, acid digested according to 40 CFR Part 50, Appendix G, and analyzed by Inductively Coupled Plasma with Mass Spectroscopy Detection (ICP-MS).

(i) **Air Toxics**

Air toxics samples are classified into four categories: metals, volatile organic compounds (VOC), polycyclic aromatic hydrocarbons (PAH), and carbonyls.

Metal samples are collected on 46.2 mm PTFE filters over a 24-hour period from the PM_{10} monitoring method. The filter is weighed before and after the sample run by a contract laboratory. The gain in weight in relation to the volume of air sampled is used to calculate the concentration in micrograms per cubic meter (ug/m^3). The filter is then delivered to a separate US EPA contract laboratory for analysis by inductively coupled plasma/mass spectrometer analysis.

VOC samples are collected in a passivated vacuum canister. Ambient air is pulled into the canister over a 24-hour sampling period. The sample is shipped to an US EPA contract laboratory for analysis via gas chromatography. Additionally, LMAPCD operates a continuous automatic gas chromatographs, which continuously monitor for various VOCs and hazardous air pollutants.

PAH samples are collected by a hi-volume air sampler over a 24-hour period. The sample is collected on a polyurethane foam filter cartridge. After sampling, the filter cartridge is packed on ice and shipped to a US EPA contract laboratory for analysis via gas chromatography/mass spectrometry.

Carbonyl samples are collected on a DNPH cartridge. An ambient air stream flows through the cartridge at a one-liter per minute flow rate for a 24-hour sampling period. The cartridge is packed on ice and shipped to an US EPA contract laboratory for high-pressure liquid chromatography analysis.

(j) **Black Carbon**

LMAPCD plans to incorporate a black carbon monitor at the Durrett Lane (Near-Road) site to better characterize particulate carbon species. The analysis is performed at 7 optical wavelengths spanning the range from the near-infrared (950 nm) to the near-ultraviolet (370 nm). The sequencing of illumination and analysis is performed on a 1-Hz time base, yielding the complete spectrum of aerosol optical absorption with one data line every second.

The optical performance of the monitor is validated by a 'Neutral Density Optical Filter Kit', consisting of four precision optical elements whose absorbance is traceable to fundamental standards. Software routines measure the optical intensities at all wavelengths and compare the analysis at the instant with the original reference values.

(j) **RadNet**

The US EPA RadNet fixed air station consists of a high-volume sampler that pulls ambient air through a 4-inch diameter filter at a rate of 1,000 liters per minute. Filters are collected twice each week. The instrument also consists of two radiation detectors that continuously measure gamma and beta radiation from particulates collected on the air filter. Data is recorded to the monitor's CPU and is sent hourly to the National Air and Radiation Environmental Laboratory (NAREL) for evaluation.

The RadNet network, which has stations in each State, has been used to track environmental releases of radioactivity from nuclear weapons tests and nuclear accidents. RadNet also documents the status and trends of environmental radioactivity. In general, data generated from RadNet provides the information base for making decisions necessary to ensure the protection of public health. The system helps the EPA determine whether additional sampling or other actions are needed in response to particular releases of radioactivity to the environment. RadNet can also provide supplementary information on population exposure, radiation trends, and other aspects of releases. Data is published by NAREL in a quarterly report entitled *Environmental Radiation Data*. While KDAQ and LMAPCD operate the monitors, all other aspects, including maintenance and data responsibility, are handled by the US EPA. For more information, please visit the US EPA's RadNet website: epa.gov/radnet.

7. Quality Assurance Status

The Division for Air Quality and LMAPCD both have an extensive quality assurance program to ensure that all air monitoring data collected is accurate and precise. KDAQ staff members audit air monitors on a scheduled basis, including those operated by the Louisville Metro Air Pollution Control District and the National Park Service, to ensure that each instrument is calibrated and operating properly. Agencies audit their data monthly and verify that the data reported by each instrument is recorded accurately in the computerized database.

8. Scale of Representativeness

Each station in the monitoring network must be described in terms of the physical dimensions of the air parcel nearest the monitoring station throughout which actual pollutant concentrations are reasonably similar. Area dimensions or scales of representativeness used in the network description are:

(a) Microscale - defines the concentration in air volumes associated with area dimensions ranging from several meters up to about 100 meters.

(b) Middle scale - defines the concentration typical of areas up to several city blocks in size with dimensions ranging from about 100 meters to 0.5 kilometers.

(c) Neighborhood scale - defines the concentrations within an extended area of a city that has relatively uniform land use with dimensions in the 0.5 to 4.0 kilometers.

(d) Urban scale - defines an overall city-sized condition with dimensions on the order of 4 to 50 kilometers.

(e) Regional Scale - defines air quality levels over areas having dimensions of 50 to hundreds of kilometers.

The scale of representativeness is closely related to the type of air monitoring site and the objectives of that site. There are six basics types of sites supported by the ambient air monitoring network:

(a) To determine the highest concentrations expected to occur in the area covered by the network.

(b) To determine representative concentrations in areas of high population density.

(c) To determine the impact on ambient pollution levels of significant sources or source categories.

(d) To determine the extent of regional transport of pollutants.

(e) To determine general background concentration levels.

(f) To determine impacts on visibility, vegetation damage, or other welfare-based concerns.

The design intent in siting stations is to correctly match the area dimensions represented by the sample of monitored air with the area dimensions most appropriate for the monitoring objective of the station. The following relationship of these six basic site type and the scale of representativeness are appropriate when siting monitoring stations:

Monitoring Site Type	Scale of Representativeness
Highest Concentration	Micro, Middle, Neighborhood
Population Oriented	Neighborhood, Urban
Source Impact	Micro, Middle, Neighborhood
Regional Transport & General Background	Neighborhood, Regional
Welfare-based Impacts	Urban, Regional

Data Processing and Reporting

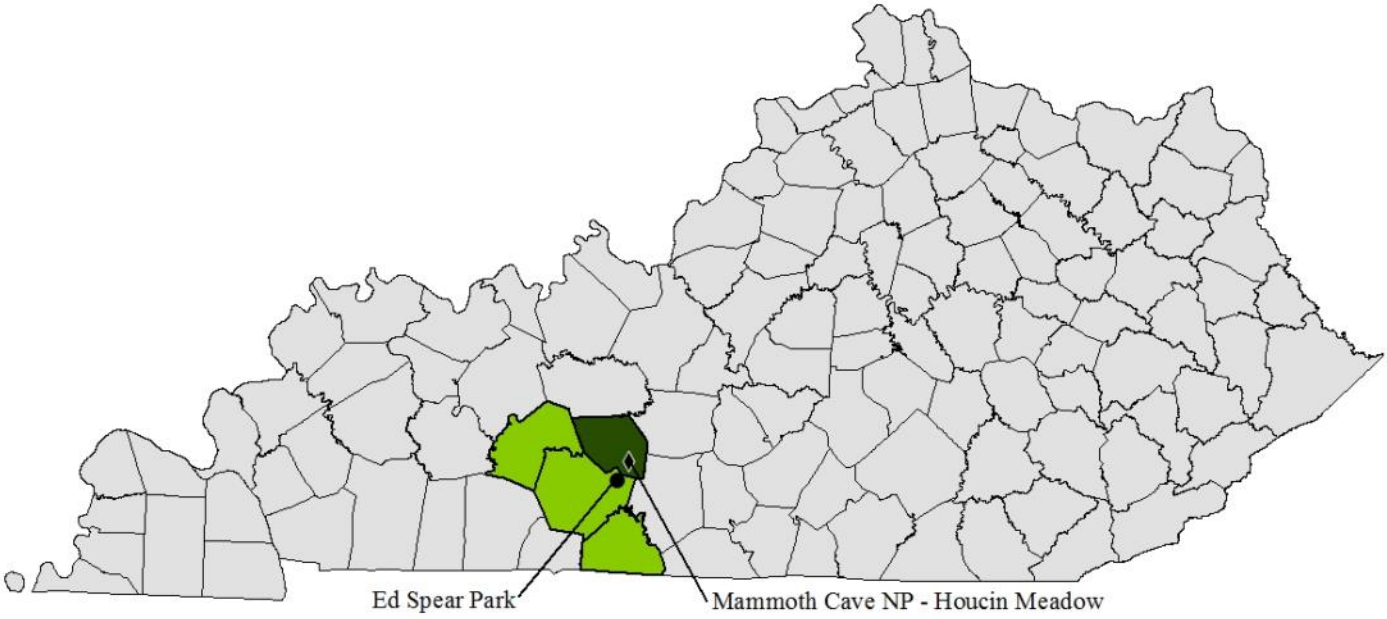
All ambient air quality data collected by KDAQ are stored on a server located at the main office building of Commonwealth Office of Technology at 101 Cold Harbor Drive, Frankfort, Kentucky. The server runs a full database back up every night and keeps an hourly transaction log. After each month of data has passed all quality assurance checks, the data is transmitted via telemetry to the US EPA's national data storage system known as AQS.

All ambient air quality and meteorological data collected by LMAPCD are stored on a server maintained by Louisville Metro's Department of Information Technology (DoIT) located at 410 South 5th Street in Louisville, KY. The server runs a full database back up every night and those data are stored at an offsite facility for disaster recovery purposes.

Statistical data summaries generated from the AQS database are compiled to produce the Ambient Air Quality Annual Report. This report may be accessed at the KDAQ website: https://eec.ky.gov/Environmental-Protection/Air/Pages/Division-Reports.aspx.

AIR MONITORING STATION DESCRIPTIONS

Bowling Green, KY



AQS ID / County	Site Address	PM2.5	Cont. PM2.5	PM10	Cont. PM10	SO2	NO2	NOy	CO	O3	Pb	VOC	Carbonyl	PAH	PM2.5 Spec.	Carbon Spec.	Black Carbon	RadNet	Met
21-061-0501	Alfred Cook Road									1[F, M]									1[F]
Edmonson	Mammoth Cave (NPS)																		
21-227-0009	226 Sunset Ave.		2[C,S,i]							1[i]									
Warren	Smiths Grove																		
Totals	**2**		**2**							**2**									**1**

Tallies are equal to the actual number of monitors present. Superscripts represent additional information about the network.

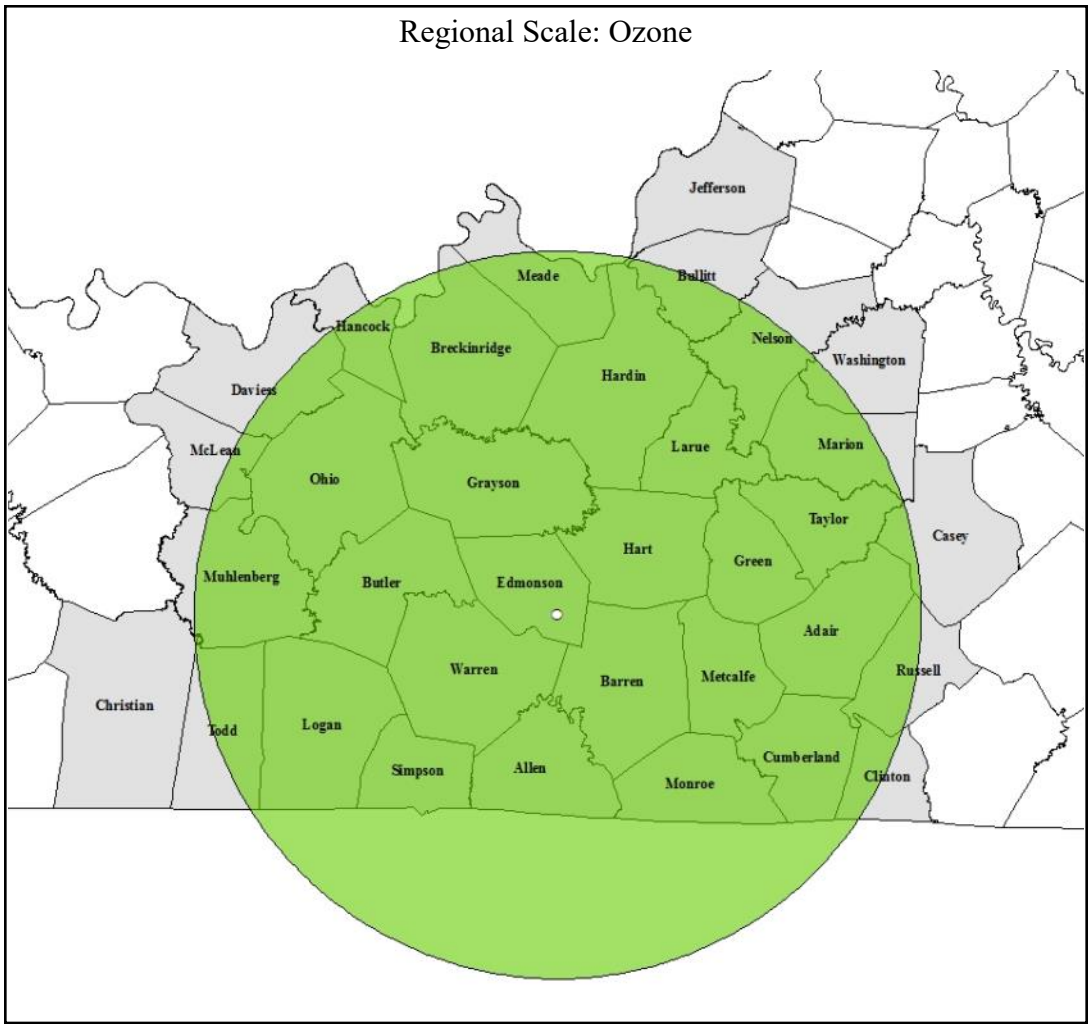
F =Non-EPA Federal Monitor
S =Continuous T640 Monitor
C =Collocated
i =AQI Reported
M =Maximum Ozone Concentration Site for MSA

CSA/MSA: Bowling Green-Glasgow-Franklin, KY CSA; Bowling Green, KY MSA
401 KAR 50:020 Air Quality Region: South Central Kentucky Intrastate (105)
Site Name: Mammoth Cave National Park-Houchin Meadow
AQS Site ID: 21-061-0501
Location: Alfred Cook Road, Park City, KY 42160
County: Edmonson
GPS Coordinates: 37.13182, -86.147944 (NAD83)
Date Established: August 1, 1997
Inspection Date: December 4, 2024
Inspection By: Nall

Mammoth Cave National Park was established as one of 156 mandatory Federal Class I Areas nationwide under the Clean Air Act Amendments of 1977. Class I Areas are imparted with the highest level of air quality protections, especially regarding visibility degradation (haze). The Division maintains a cooperative relationship with Mammoth Cave National Park and frequently includes the site's data in air quality analyses. Additionally, the ozone monitor is designated as the "Maximum Ozone Concentration" monitor for the Bowling Green, KY MSA. However, KDAQ does not operate the site nor certify the annual data. While the park conducts a variety of air quality studies, only certain data is reported to the EPA's AQS database.

Monitors				
Monitor Type	**Inlet Height (meters)**	**Designation**	**Analysis Method**	**Frequency of Sampling**
AEM Ozone	10.2	CASTNET Maximum O_3 Non-EPA Federal Transport	Automated Equivalent Method utilizing UV photometry analysis	Continuously
Meteorological	13.6	Non-EPA Federal	AQM grade instruments for wind speed, wind direction, humidity, barometric pressure, and temperature	Continuously

Area Representativeness:
This site represents a regional scale for ozone.



CSA/MSA: Bowling Green-Glasgow-Franklin, KY CSA; Bowling Green, KY MSA
401 KAR 50:020 Air Quality Region: South Central Kentucky Intrastate (105)
Site Name: Ed Spear Park (Smiths Grove)
AQS Site ID: 21-227-0009
Location: 226 Sunset Avenue, Smiths Grove, KY 42171
County: Warren
GPS Coordinates: 37.04926, -86.21487 (NAD83)
Date Established: May 3, 2012
Inspection Date: December 4, 2024
Inspection By: Nall
Site Approval Status: Site and monitors meet all design criteria for the monitoring network.

This monitoring site was established as a replacement for the Oakland (Warren County) air monitoring station (21-227-0008). In October 2010, the Oakland site was found to be sitting within the doline of a sinkhole and was discontinued. Monitoring was established at the new Ed Spear Park site in May 2012. Inspections found the sample lines and equipment to be in good condition. The sample inlets are 39 meters from the nearest road. The site meets the requirements of 40 CFR 58, Appendices A, C, D, E and G.

Monitoring Objective:
The monitoring objectives are to determine compliance with National Ambient Air Quality Standards. While not required for the CBSA, the site also provides levels of ozone and particulate matter for daily index reporting.

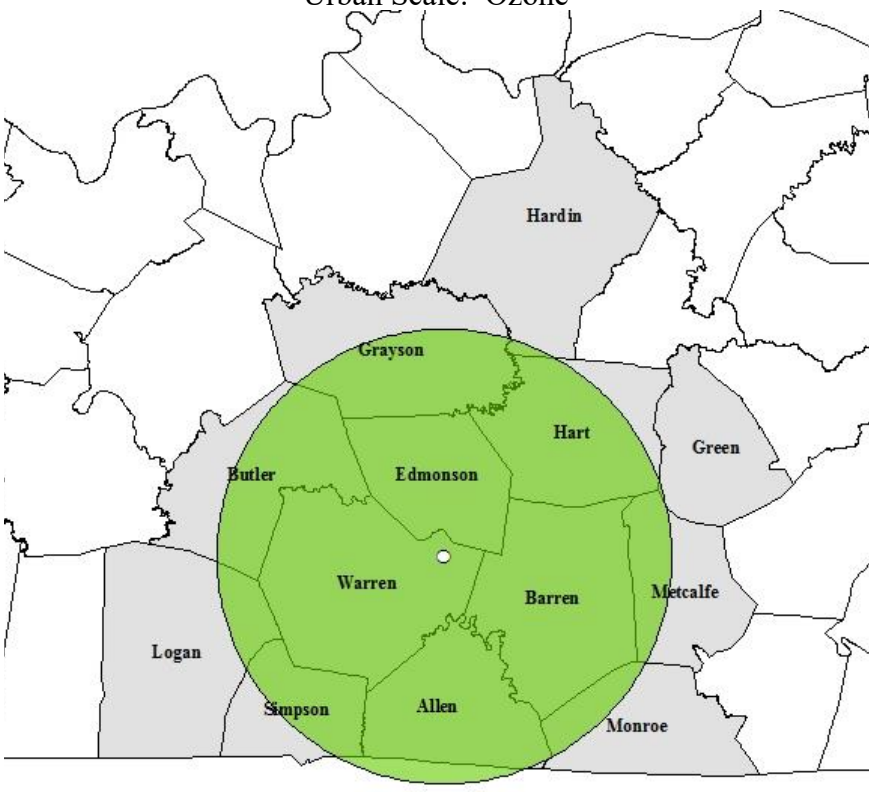
Monitors				
Monitor Type	**Inlet Height (meters)**	**Designation**	**Analysis Method**	**Frequency of Sampling**
AEM Ozone	4.1	SLAMS AQI	UV photometry	Continuously March 1 – October 31
FEM $PM_{2.5}$ Continuous	4.67	SLAMS AQI	Broadband Spectroscopy	Continuously
Collocated FEM $PM_{2.5}$ Continuous	4.68	SLAMS	Broadband Spectroscopy	Continuously

Quality Assurance Status:
All Quality Assurance procedures have been implemented in accordance with 40 CFR 58, Appendix A.

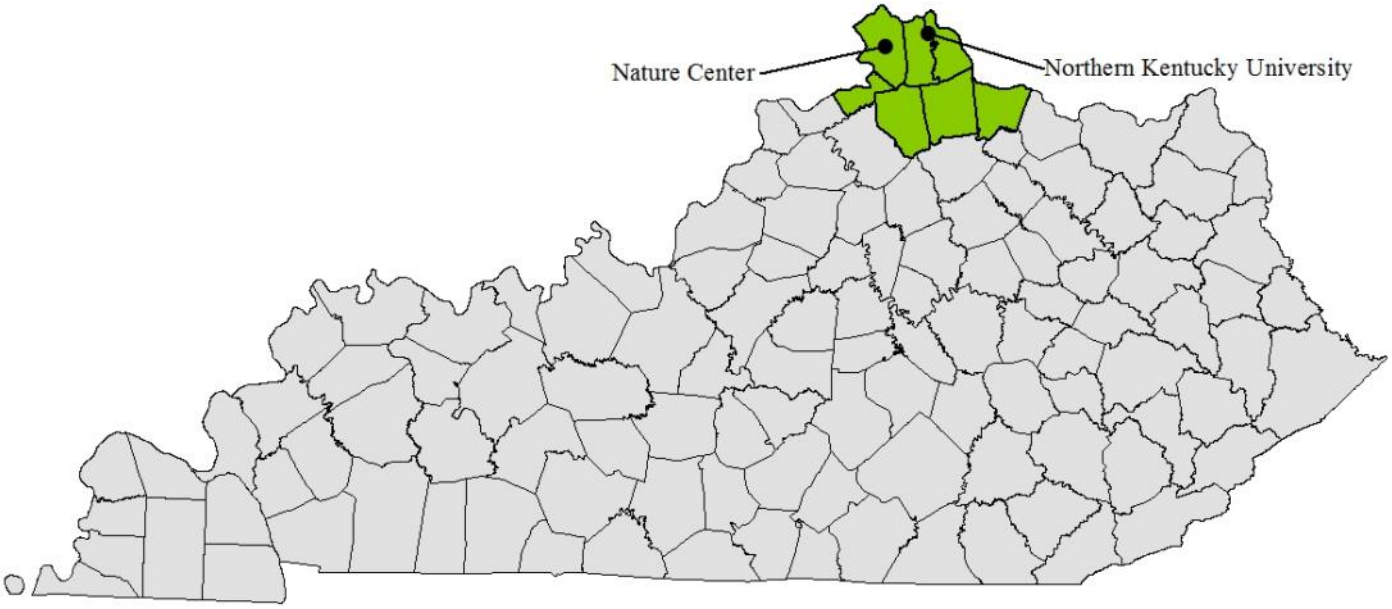
Area Representativeness:
This site represents population exposure on a neighborhood scale for particulates. This site also represents population exposure on an urban scale for ozone.

Neighborhood Scale: Particulates

Urban Scale: Ozone



Cincinnati, OH-KY-IN



AQS ID / County	Site Address	PM2.5	Cont. PM2.5	PM10	Cont. PM10	SO2	NO2	NOy	CO	O3	Pb	VOC	Carbonyl	PAH	PM2.5 Spec.	Carbon Spec.	Black Carbon	RadNet	Met
21-015-0008	9101 Camp Ernst Rd									1[i]									
Boone	Union																		
21-037-3002	524A John's Hill Rd	2[C]	1[S,C,i]			1	1			1[e,i]									
Campbell	Highland Heights																		
Totals	**2**	**2**	**1**			**1**	**1**			**2**									

Tallies are equal to the actual number of monitors present. Superscripts represent additional information about the network.

i =AQI Reported
C =Collocated Monitors
e =Emergency Episode Monitor
S =Continuous T640 Monitor

CSA/MSA: Cincinnati-Wilmington, OH-KY-IN CSA; Cincinnati, OH-KY-IN MSA
401 KAR 50:020 Air Quality Region: Metropolitan Cincinnati (Ohio) Interstate (079)
Site Name: Nature Center
AQS Site ID: 21-015-0008
Location: 9101 Camp Ernst Rd, Union, KY 41091
County: Boone
GPS Coordinates: 38.9674434, -84.7213627(NAD 83)
Date Established: April 13, 2022
Inspection Date: October 17, 2024
Inspection By: Nall
Site Approval Status: Site and monitor meet all design criteria for the monitoring network.

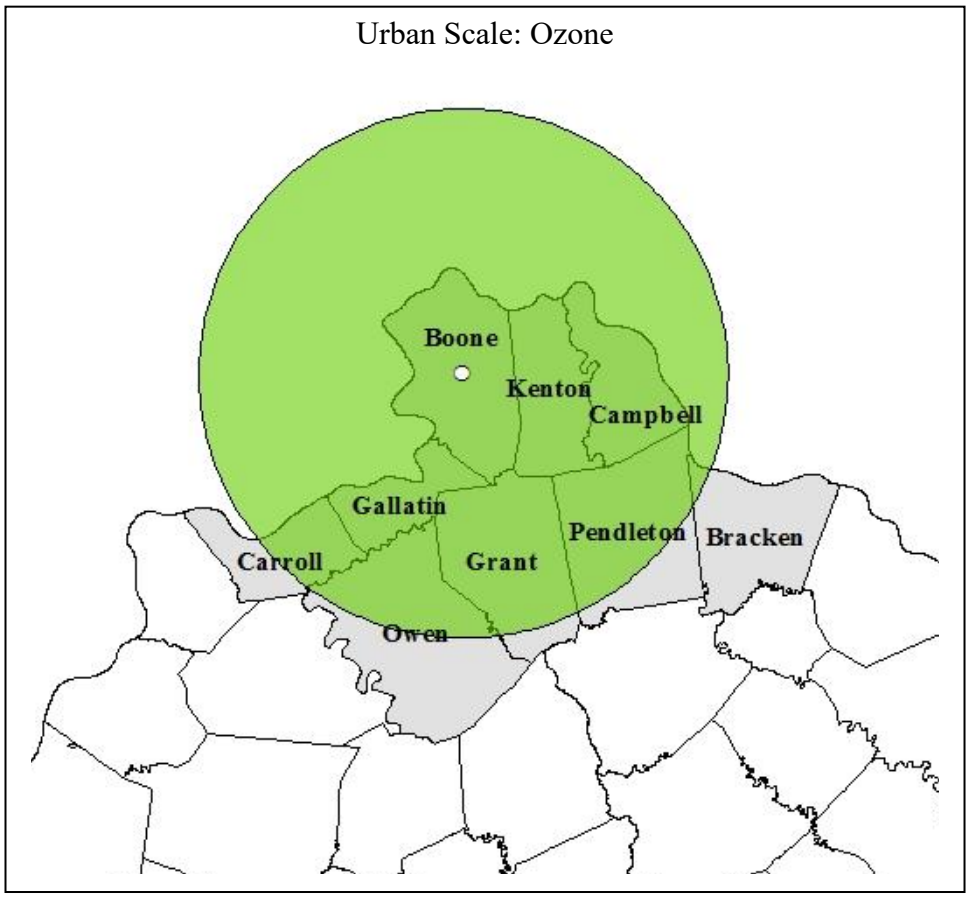
This monitoring site was established as a replacement for East Bend (21-015-0003) due to siting issues that could not be resolved. The site is located on the grounds of the Boone County Extension Environmental and Nature Center. A Kentucky Mesonet station is located approximately 45 meters SSW from the air monitoring shelter. The sample inlet is approximately 29 meters from the nearest road. Upon inspection, the sample line and monitor were found to be in good condition. The site meets the requirements of 40 CFR 58, Appendices A, C, D, E, and G.

Monitoring Objective:
The monitoring objective is to determine compliance with National Ambient Air Quality Standards.

Monitors				
Monitor Type	**Inlet Height (meters)**	**Designation**	**Analysis Method**	**Frequency of Sampling**
AEM Ozone	3.84	SLAMS AQI	UV photometry	Continuously March 1 – October 31

Quality Assurance Status:
All Quality Assurance procedures have been implemented in accordance with 40 CFR 58, Appendix A.

Area Representativeness:
This site will represent the upwind background levels on an urban scale for ozone.



CSA/MSA: Cincinnati-Wilmington, OH-KY-IN CSA; Cincinnati, OH-KY-IN MSA
401 KAR 50:020 Air Quality Region: Metropolitan Cincinnati (Ohio) Interstate (079)
Site Name: Northern Kentucky University (NKU)
AQS Site ID: 21-037-3002
Location: 524A John's Hill Road, Highland Heights, KY 41076
County: Campbell
GPS Coordinates: 39.021834, -84.474436 (NAD 83)
Date Established: August 1, 2007
Inspection Date: October 17, 2024
Inspection By: Nall
Site Approval Status: Site and monitors meet all design criteria for the monitoring network.

The monitoring site is a stationary equipment shelter located on farmland owned by Northern Kentucky University in Highland Heights, Kentucky. The sample inlets are 450 meters from the nearest road, which is Interstate 275. Upon inspection, the sample lines and monitors were found to be in good condition. The site meets the requirements of 40 CFR 58, Appendices A, C, D, E and G.

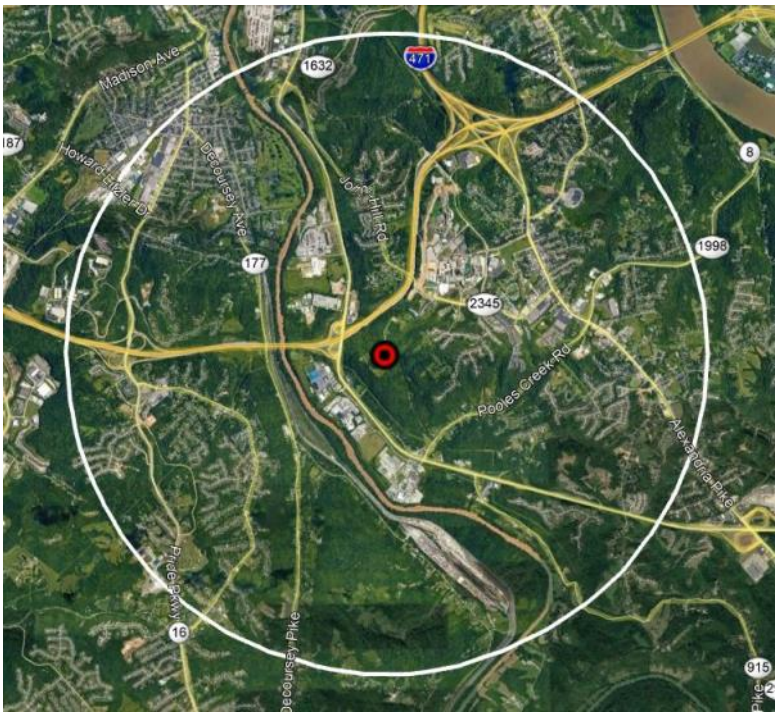
Monitoring Objective:
The monitoring objectives are to determine compliance with National Ambient Air Quality Standards; to provide ozone, particulate, nitrogen dioxide, and sulfur dioxide levels for daily index reporting; and to detect elevated pollutant levels for activation of emergency control procedures for ozone.

Monitors				
Monitor Type	**Inlet Height (meters)**	**Designation**	**Analysis Method**	**Frequency of Sampling**
AEM Nitrogen Dioxide (NO_2, NO, NO_x)	3.78	SLAMS	Chemiluminescence	Continuously
AEM Ozone	3.8	SLAMS AQI EPISODE	UV photometry	Continuously March 1 – October 31
FRM $PM_{2.5}$	4.63	SLAMS	Gravimetric	24-hours every third day
Collocated FRM $PM_{2.5}$	4.63	SLAMS	Gravimetric	24-hours every sixth day
FEM $PM_{2.5}$ Continuous	4.61	SLAMS AQI	Broadband Spectroscopy	Continuously
AEM Sulfur Dioxide	3.78	SLAMS	UV fluorescence	Continuously

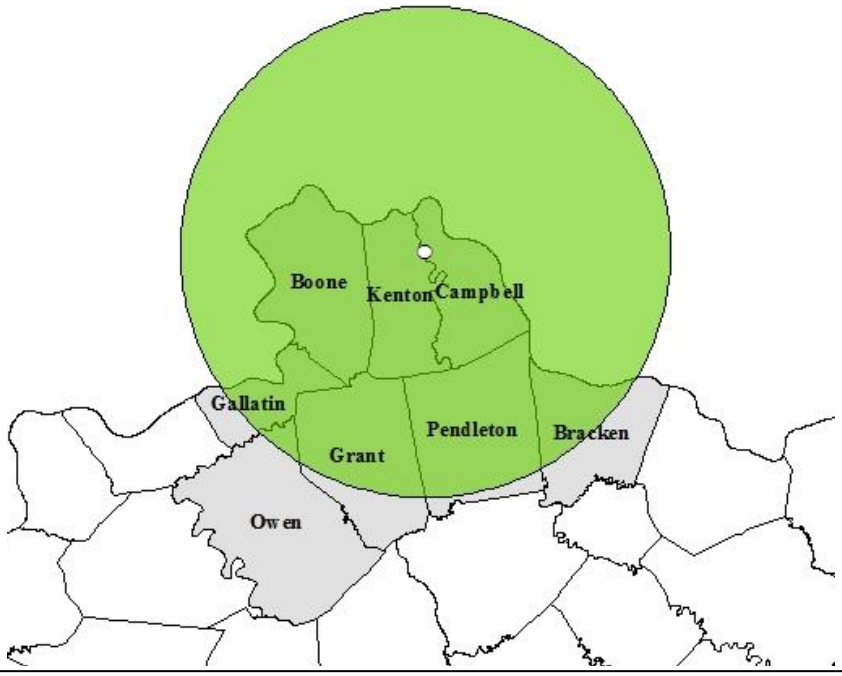
Quality Assurance Status:
All Quality Assurance procedures have been implemented in accordance with 40 CFR 58, Appendix A.

Area Representativeness:
This site represents population exposure for nitrogen dioxide, ozone, and sulfur dioxide on an urban scale. This site also represents population exposure on a neighborhood scale for particulate matter.

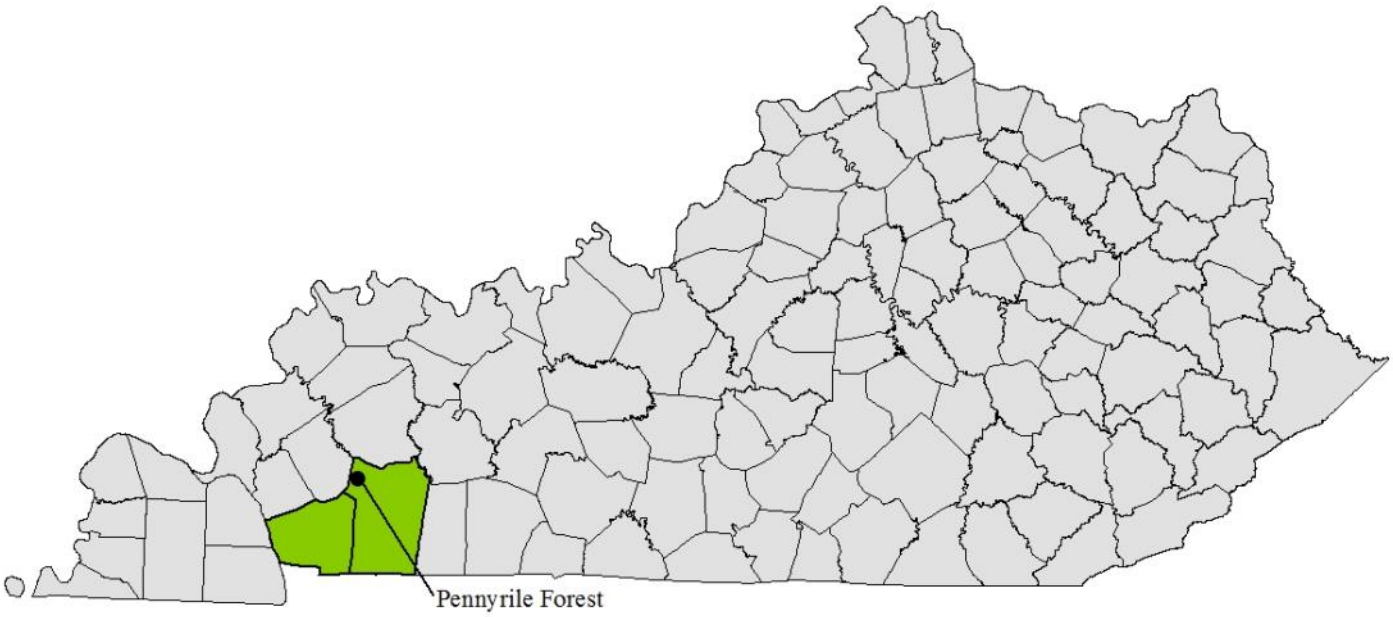
Neighborhood Scale: Particulates



Urban Scale: Nitrogen Dioxide, Ozone, Sulfur Dioxide



Clarksville, TN-KY



AQS ID / County	Site Address	PM2.5	Cont. PM2.5	PM10	Cont. PM10	SO2	NO2	NOy	CO	O3	Pb	VOC	Carbonyl	PAH	PM2.5 Spec.	Carbon Spec.	Black Carbon	RadNet	Met
21-047-0007	Pennyrile Forest State Park Rd & Bainbridge Rd		1 i,S,X							1 i, M									
Christian	Dawson Springs																		
Totals	**1**		**1**							**1**									

Tallies are equal to the actual number of monitors present. Superscripts represent additional information about the network.

X =Regional Transport PM2.5 Monitor

i =AQI Reported

S =Continuous T640 Monitor

M = Maximum Ozone Concentration Site for MSA

CSA/MSA: Clarksville, TN- KY MSA
401 KAR 50:020 Air Quality Region: Paducah - Cairo Interstate (072)
Site Name: Pennyrile Forest
AQS Site ID: 21-047-0007
Location: Pennyrile Forest State Park Rd. and Bainbridge Rd., Dawson Springs, KY 42408
County: Christian
GPS Coordinates: 37.05778, -87.65 (NAD 83)
Date Established: TBD
Inspection Date: TBD
Inspection By: TBD
Site Approval Status: Approved for site relocation

Due to increased traffic along an adjacent gravel road, the Hopkinsville site (21-047-0006) is being relocated to a field on Pennyrile State Forest property. The new site is slated to begin July 1, 2025. The Hopkinsville site will run until the shelter can be relocated to the Pennyrile Forest. The monitoring site will be a stationary equipment shelter and will continue to run the same equipment as the Hopkinsville site. Additional information can be found in the 2024 Kentucky Network Plan Addendum.

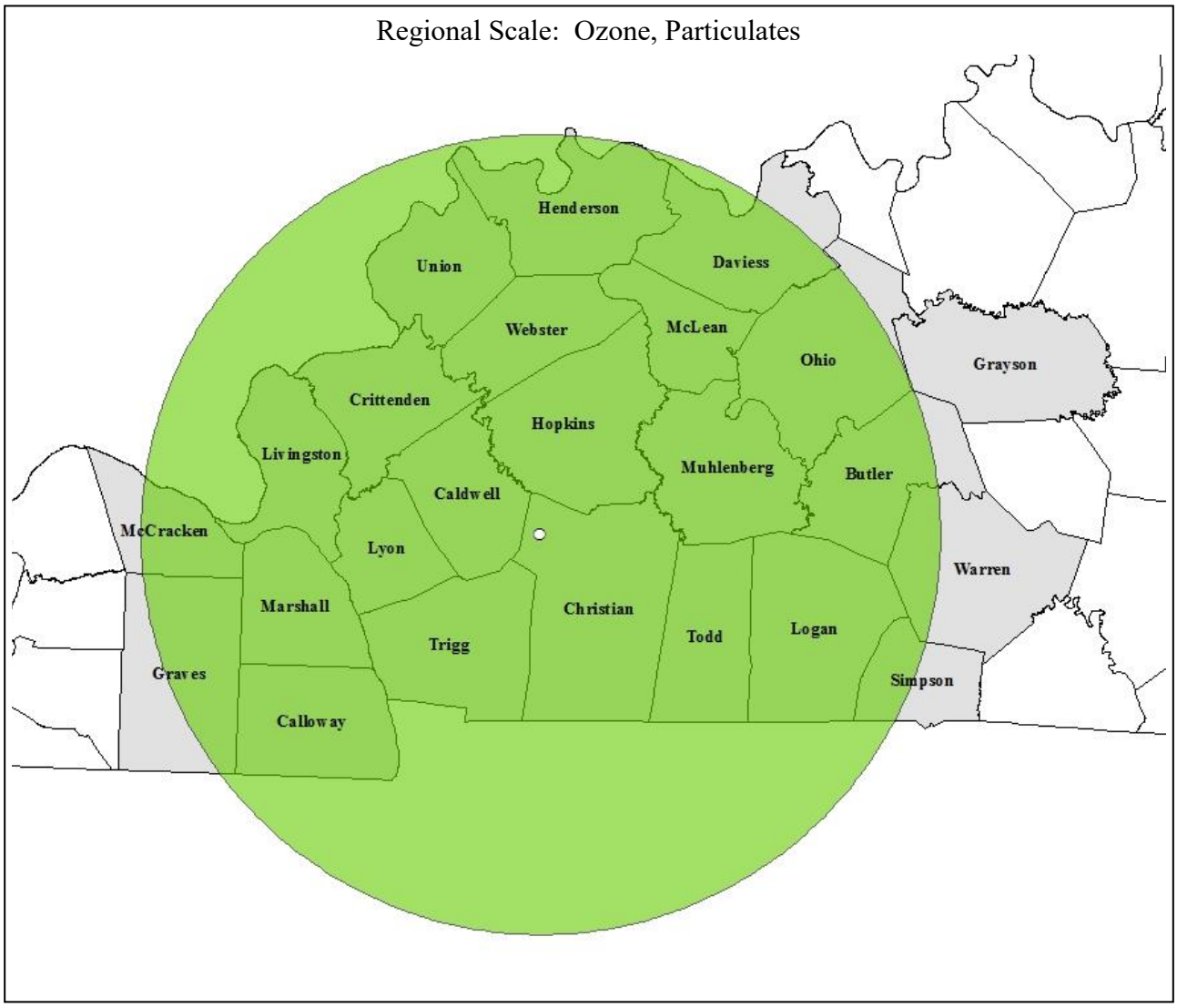
Monitoring Objective:

The monitoring objectives are to determine compliance with National Ambient Air Quality Standards and to determine levels of interstate regional transport of fine particulate matter and ozone.

Monitors				
Monitor Type	**Inlet Height (meters)**	**Designation**	**Analysis Method**	**Frequency of Sampling**
AEM Ozone	TBD	SLAMS AQI Maximum O_3 Transport	UV photometry	Continuously March 1 – October 31
FEM $PM_{2.5}$ Continuous	TBD	SLAMS AQI Transport	Broadband Spectroscopy	Continuously

Quality Assurance Status:
All Quality Assurance procedures will be implemented in accordance with 40 CFR 58, Appendix A.

Area Representativeness:
This site represents population exposure on a regional scale for ozone and $PM_{2.5}$.



Elizabethtown, KY

AQS ID / County	Site Address	PM2.5	Cont. PM2.5	PM10	Cont. PM10	SO2	NO2	NOy	CO	O3	Pb	VOC	Carbonyl	PAH	PM2.5 Spec.	Carbon Spec.	Black Carbon	RadNet	Met
21-093-0007	140 Freeman Lake Park Rd	1[C]	1[S,i]							1[M,i]									
Hardin	Elizabethtown																		
Totals	**1**	**1**	**1**							**1**									

Tallies are equal to the actual number of monitors present. Superscripts represent additional information about the network.

C =Collocated
M =Maximum Ozone Concentration Site for MSA
S =Continuous T640 Monitor
i =AQI Reported

CSA/MSA: Louisville/Jefferson County - Elizabethtown, KY-IN CSA; Elizabethtown, KY MSA
401 KAR 50:020 Air Quality Region: North Central Kentucky Interstate (104)
Site Name: Freeman Lake
AQS Site ID: 21-093-0007
Location: Freeman Lake Park, 140 Freeman Lake Park Road, Elizabethtown, KY, 42701
County: Hardin
GPS Coordinates: 37.7145134, -85.8708227 (NAD 83)
Date Established: March 1, 2025
Inspection Date: March 6, 2025
Inspection By: Nall
Site Approval Status: Site and monitors meet all design criteria for the monitoring network.

The monitoring site is a stationary equipment shelter located on the grounds of Freeman Lake Park. The site is located on the southside of the lake, near a water treatment plant that is no longer in operation. The sample inlets are approximately 182 meters from the nearest road. This site was formally Elizabethtown (21-093-0006) which had to be relocated due to land development. The site meets requirements of 40 CFR 58, Appendices A, C, D, and E.

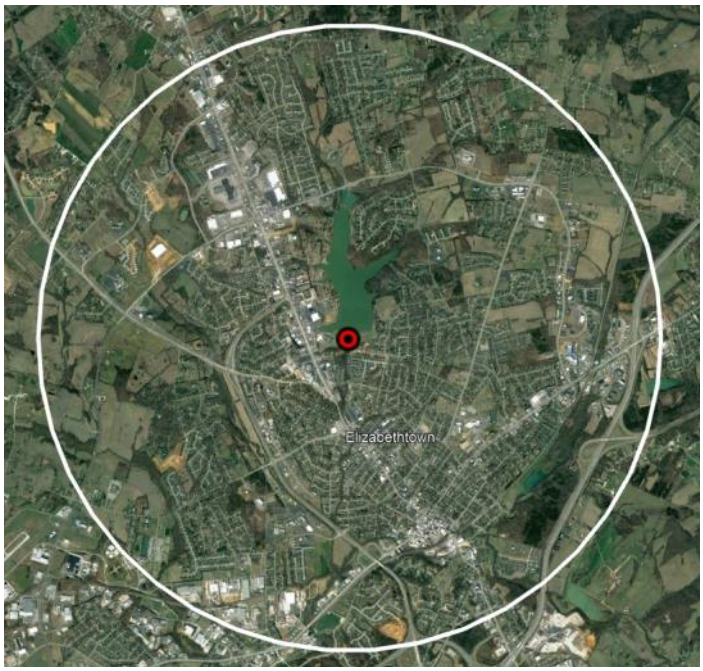
Monitoring Objective:
The monitoring objectives are to determine compliance with National Ambient Air Quality Standards.

Monitors				
Monitor Type	**Inlet Height (meters)**	**Designation**	**Analysis Method**	**Frequency of Sampling**
AEM Ozone	3.91	SLAMS AQI Maximum O_3	UV photometry	Continuously March 1 – October 31
FEM $PM_{2.5}$ Continuous	4.69	SLAMS AQI	Broadband Spectroscopy	Continuously
Collocated FRM $PM_{2.5}$	4.47	SLAMS	Gravimetric	24-hours every sixth day

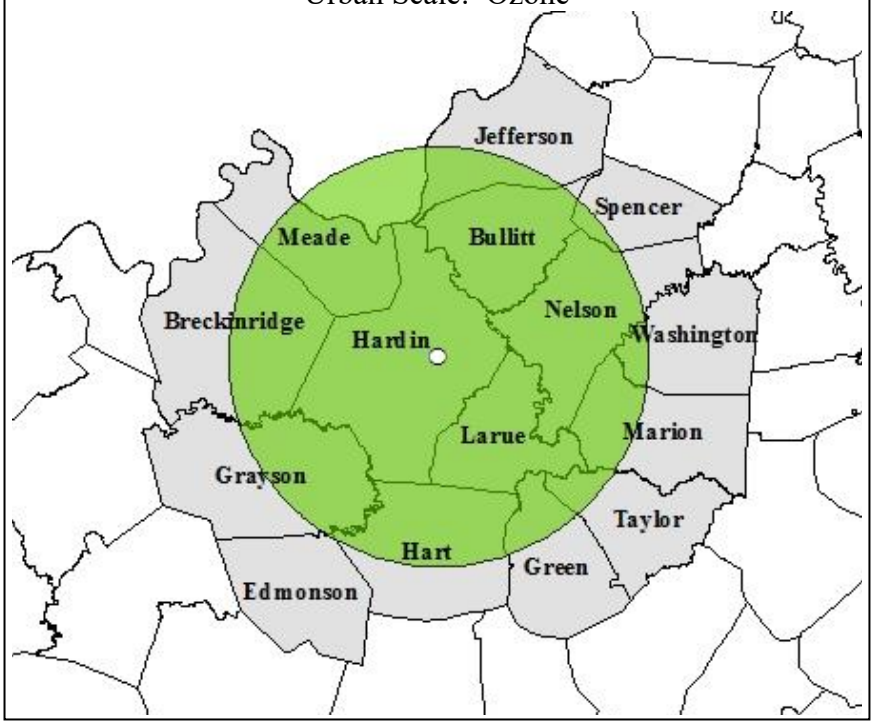
Quality Assurance Status:
All Quality Assurance procedures have been implemented in accordance with 40 CFR 58, Appendix A.

Area Representativeness:
This site will represent population exposure on a neighborhood scale for particulates and population exposure on an urban scale for ozone.

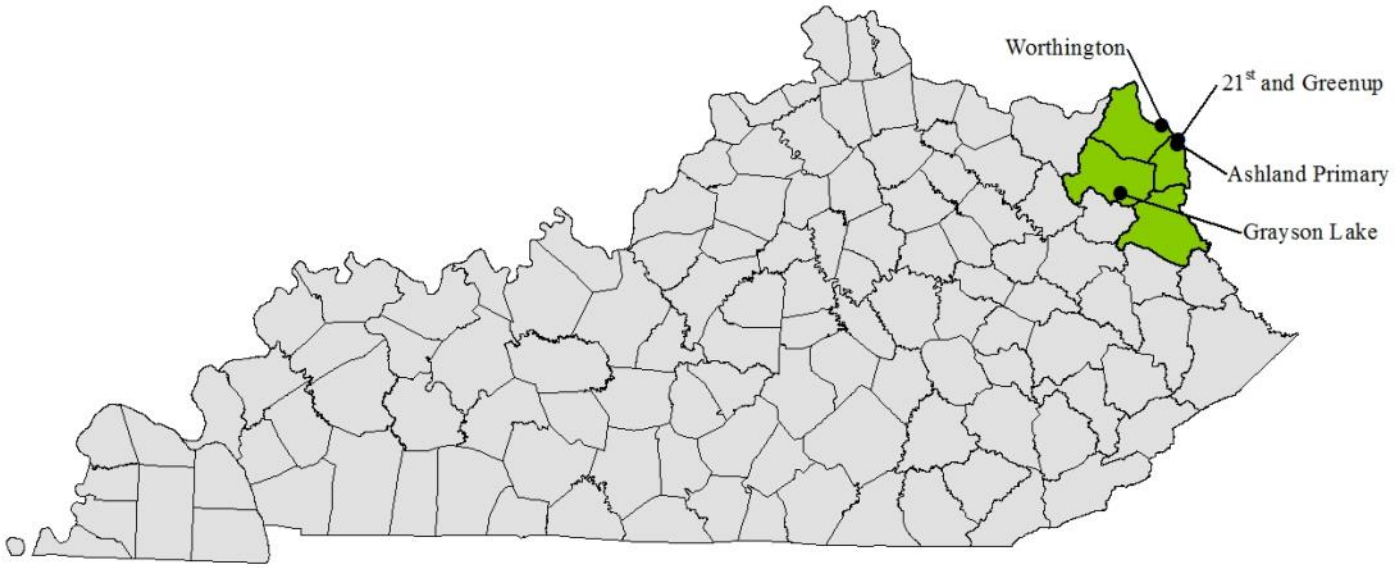
Neighborhood Scale: Particulates



Urban Scale: Ozone



Huntington-Ashland, WV-KY-OH



AQS ID / County	Site Address	PM2.5	Cont. PM2.5	PM10	Cont. PM10	SO2	NO2	NOy	CO	O3	Pb	VOC	Carbonyl	PAH	PM2.5 Spec.	Carbon Spec.	Black Carbon	RadNet	Met
21-019-0002	122 22nd Street			$2^{C,m}$															
Boyd	Ashland																		
21-019-0017	2924 Holt Street		$1^{S,i}$			1^{e}	1^{e}			$1^{e,i,M}$									
Boyd	Ashland																		
21-043-0500	1486 Camp Webb Road		$1^{i,S,X}$	$2^{C,m}$						1^{i}		2^{D}	2^{D}	1					1
Carter	Grayson																		
21-089-0007	Scott St. & Center Ave.					1^{e}				$1^{e,i}$									
Greenup	Worthington																		
Totals	**4**		**2**	**4**		**2**	**1**			**3**		**2**	**2**	**1**					**1**

Tallies are equal to the actual number of monitors present. Superscripts represent additional information about the network.

i =AQI Reported
C =Collocated
S =Continuous T640 Monitor
M =Maximum Ozone Concentration Site for MSA
m =PM10 Filter Analyzed for Metals
e =Emergency Episode Monitor
X =Regional Background PM2.5 Monitor
D =Duplicate

CSA/MSA: Charleston-Huntington-Ashland, WV-OH-KY CSA; Huntington-Ashland, WV-KY-OH MSA
401 KAR 50:020 Air Quality Region: Huntington (WV)-Ashland (KY)-Portsmouth-Ironton (OH) Interstate (103)
Site Name: 21st and Greenup
AQS Site ID: 21-019-0002
Location: 121 22nd Street, Ashland, KY 41101
County: Boyd
GPS Coordinates: 38.47676, -82.63137 (NAD 83)
Date Established: April 2, 1978
Inspection Date: October 1, 2024
Inspection By: Nall
Site Approval Status: Site and monitors meet all design criteria for the monitoring network.

The monitoring site is located on the west end of the roof of the Valvoline Oil complex building in Ashland, Kentucky. The building is one story tall. The sample inlets are 38 meters from the nearest road. Upon inspection, the sample inlets and monitors were found to be in good condition. The site meets the requirements of 40 CFR 58, Appendices A, C, D, and E.

Monitoring Objective:
The monitoring objectives are to determine compliance with National Ambient Air Quality Standards and to measure concentrations of a sub-group of air toxics.

Monitors				
Monitor Type	**Inlet Height (meters)**	**Designation**	**Analysis Method**	**Frequency of Sampling**
FRM PM_{10}	6.2	SLAMS	Gravimetric	24-hours every sixth day
- Metals PM_{10}		SPM-Other	Determined from the PM_{10} sample using EPA method IO 3.5	Same as PM_{10}
Collocated FRM PM_{10}	6.2	SLAMS	Gravimetric	24-hours every twelfth day
- Collocated Metals PM_{10}		SPM-Other	Determined from the PM_{10} sample using EPA method IO 3.5	24-hours; six samples per year

Quality Assurance Status:
All Quality Assurance procedures have been implemented in accordance with 40 CFR 58, Appendix A.

Area Representativeness:
The site represents maximum concentration on a middle scale for particulates and metals.

Middle Scale: Particulates and Metals

CSA/MSA: Charleston-Huntington-Ashland, WV-OH-KY CSA; Huntington-Ashland, WV-KY-OH MSA
401 KAR 50:020 Air Quality Region: Huntington (WV)-Ashland (KY)-Portsmouth-Ironton (OH) Interstate (103)
Site Name: Ashland Primary (FIVCO)
AQS Site ID: 21-019-0017
Location: FIVCO Health Department, 2924 Holt Street, Ashland, KY 41101
County: Boyd
GPS Coordinates: 38.459347, -82.640386 (NAD 83)
Date Established: January 1, 1999
Inspection Date: October 1, 2024
Inspection By: Nall
Site Approval Status: Site and monitors meet all design criteria for the monitoring network.

The monitoring site is a stationary equipment shelter located on the grounds of the health department building in Ashland, Kentucky. The sample inlets are 60 meters from the nearest road. Upon inspection, the sample lines and monitors were found to be in good condition. The site meets the requirements of 40 CFR 58, Appendices A, C, D, E, and G.

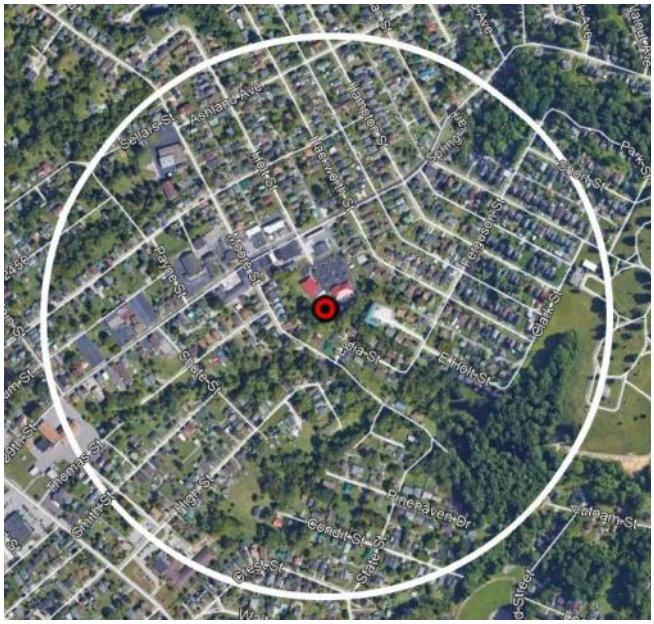
Monitoring Objective:
The monitoring objectives are to determine compliance with National Ambient Air Quality Standards; to detect elevated pollutant levels for activation of emergency control procedures for nitrogen dioxide, ozone, and sulfur dioxide; and to provide pollutant levels for daily air quality index reporting.

Monitors				
Monitor Type	**Inlet Height (meters)**	**Designation**	**Analysis Method**	**Frequency of Sampling**
AEM Nitrogen Dioxide (NO_2, NO, NO_x)	3.83	SLAMS EPISODE	Chemiluminescence	Continuously
AEM Sulfur Dioxide	3.83	SLAMS EPISODE	UV fluorescence	Continuously
AEM Ozone	3.83	SLAMS AQI EPISODE Maximum O^3	UV photometry	Continuously March 1 – October 31
FEM $PM_{2.5}$ Continuous	4.73	SLAMS AQI	Broadband spectroscopy	Continuously

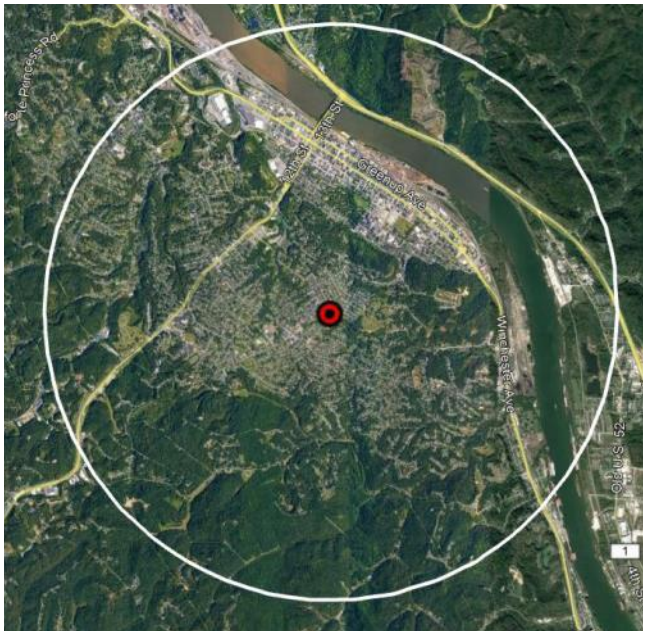
Quality Assurance Status:
All Quality Assurance procedures have been implemented in accordance with 40 CFR 58, Appendix A.

Area Representativeness:
This site represents population exposure on a neighborhood scale for air toxics, ozone, and sulfur dioxide. This site also represents maximum concentrations on a middle scale for particulates, as well as an urban scale for nitrogen dioxide.

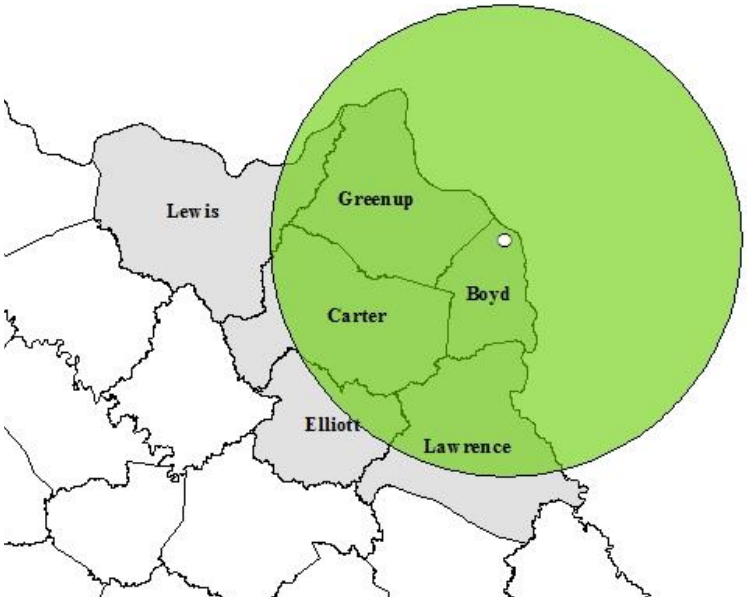
Middle Scale: Particulates



Neighborhood Scale: Ozone, Sulfur Dioxide



Urban Scale: Nitrogen Dioxide



CSA/MSA: Charleston-Huntington-Ashland, WV-OH-KY CSA; Huntington-Ashland, WV-KY-OH MSA
401 KAR 50:020 Air Quality Region: Huntington (WV)-Ashland (KY)-Portsmouth-Ironton (OH) Interstate (103)
Site Name: Grayson Lake
AQS Site ID: 21-043-0500
Location: Camp Robert Webb, 1486 Camp Webb Road, Grayson Lake, KY 41143
County: Carter
GPS Coordinates: 38.238876, -82.988059 (NAD 83)
Date Established: May 13, 1983
Inspection Date: October 1, 2024
Inspection By: Nall
Site Approval Status: Site and monitors meet all design criteria for the monitoring network.

The monitoring site is a stationary equipment shelter in a fenced area located in a remote section of Camp Webb in Grayson, Kentucky. The nearest road is a service road to the site and is 106 meters from the site. Upon inspection, the sample lines and monitors were found to be in good condition. The site meets the requirements of 40 CFR 58, Appendices A, C, D, E, and G.

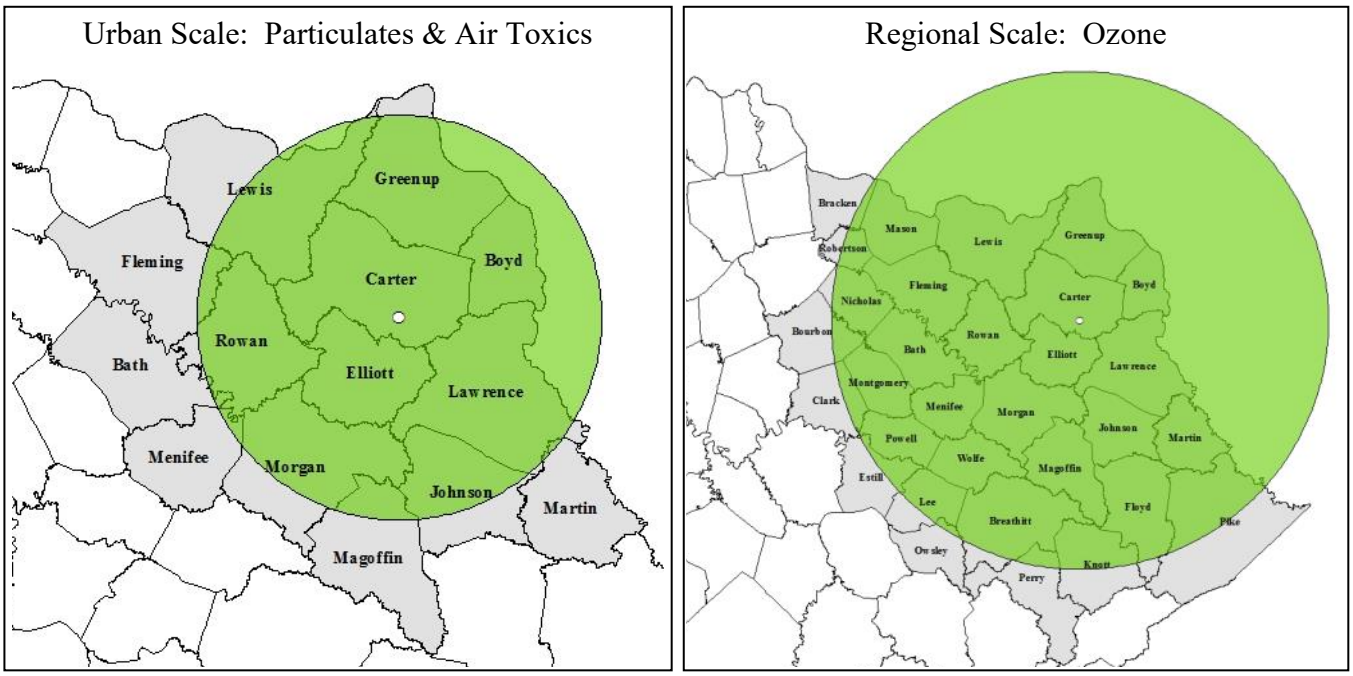
Monitoring Objective:
The monitoring objectives are to determine compliance with National Ambient Air Quality Standards; to determine background levels of $PM_{2.5}$ and PM_{10}; to provide ozone data upwind of the Ashland area; and to measure rural concentrations of a sub-group of air toxics for use in a national air toxics assessment.

Monitors				
Monitor Type	**Inlet Height (meters)**	**Designation**	**Analysis Method**	**Frequency of Sampling**
AEM Ozone	3.68	SLAMS AQI	UV photometry	Continuously March 1 – October 31
FRM PM_{10}	2.19	SLAMS	Gravimetric	24-hours every sixth day
- Metals PM_{10}		NATTS SPM-Other	Determined from the PM_{10} samples using EPA method IO 3.5	Same as PM_{10}
Collocated PM_{10}	2.19	SLAMS	Gravimetric	24-hours every twelfth day
- Collocated metals PM_{10}		NATTS SPM-Other	Determined from the PM_{10} samples using EPA method IO 3.5	24-hours; six samples per year

Monitors (Continued)				
FEM $PM_{2.5}$ Continuous	4.76	SLAMS AQI	Broadband Spectroscopy	Continuously
Volatile Organic Compounds	4.24	NATTS SPM-Other	EPA method TO-15.	24-hours every sixth day
- Duplicate Volatile Organic Compounds		NATTS SPM-Other	EPA method TO-15. Collected via same sampling system as primary VOCs.	24-hours; six samples per year
Polycyclic Aromatic Hydrocarbons	2.11	NATTS SPM-Other	EPA method TO-13A	24-hours every sixth day
Carbonyls	4.24	NATTS SPM-Other	EPA method TO-11A	24-hours every sixth day
- Duplicate Carbonyls		NATTS SPM-Other	EPA method TO-11A. Collected via same sampling system as primary carbonyls.	24-hours; six samples per year
Meteorological	13.6	Other	AQM grade instruments for wind speed, wind direction, and temperature	Continuously

Quality Assurance Status:
All Quality Assurance procedures have been implemented in accordance with 40 CFR 58, Appendix A.

Area Representativeness:
The site represents background levels on an urban scale for particulates and air toxics. This site also represents upwind/background levels on an regional scale for ozone.



CSA/MSA: Charleston-Huntington-Ashland, WV-OH-KY CSA; Huntington-Ashland, WV-KY-OH MSA
401 KAR 50:020 Air Quality Region: Huntington (WV)-Ashland (KY)-Portsmouth-Ironton (OH) Interstate (103)
Site Name: Worthington
AQS Site ID: 21-089-0007
Location: Scott Street & Center Avenue, Worthington, KY 41183
County: Greenup
GPS Coordinates: 38.548156, -82.731156 (NAD 83)
Date Established: October 12, 1980
Inspection Date: October 1, 2024
Inspection By: Nall
Site Approval Status: Site and monitors meet all design criteria for the monitoring network.

The monitoring site is a stationary equipment shelter located on the grounds of a water tower near the intersection of Scott Street and Center Avenue in Worthington, Kentucky. The sample inlets are 19 meters from the nearest road. Upon inspection, the sample lines and monitors were found to be in good condition. The site meets the requirements of 40 CFR 58, Appendices A, C, D, E, and G.

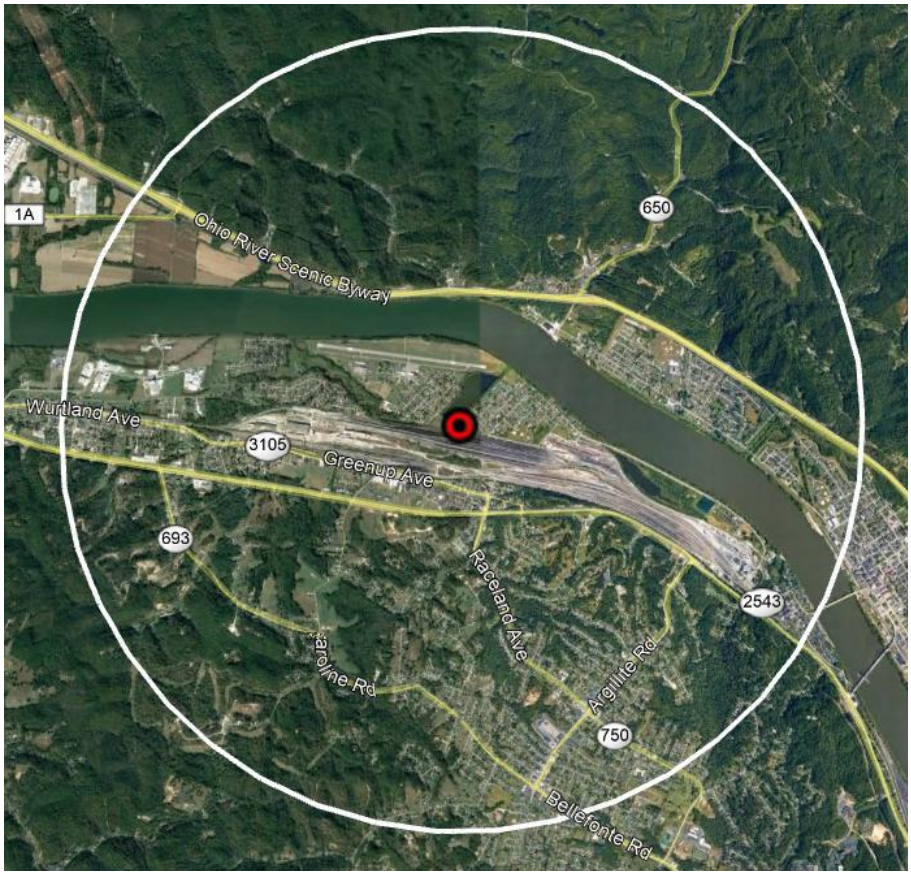
Monitoring Objective:
The monitoring objectives are to determine compliance with National Ambient Air Quality Standards; to detect elevated pollutant levels for activation of emergency control procedures for ozone and sulfur dioxide.

Monitors				
Monitor Type	**Inlet Height (meters)**	**Designation**	**Analysis Method**	**Frequency of Sampling**
AEM Ozone	4.2	SLAMS EPISODE AQI	UV photometry	Continuously March 1 – October 31
AEM Sulfur Dioxide	4.18	SLAMS EPISODE	UV fluorescence	Continuously

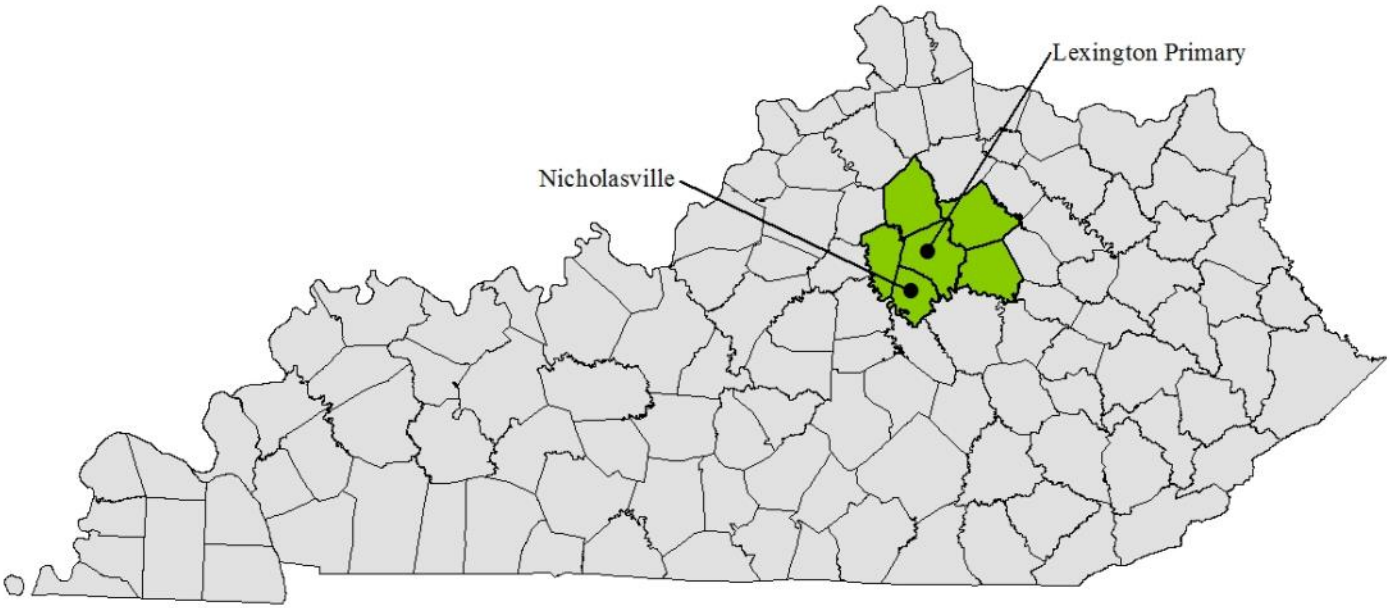
Quality Assurance Status:
All Quality Assurance procedures have been implemented in accordance with 40 CFR 58, Appendix A.

Area Representativeness:
This site represents population exposure on a neighborhood scale for ozone and sulfur dioxide.

Neighborhood Scale: Ozone and Sulfur Dioxide



Lexington-Fayette, KY



AQS ID / County	Site Address	PM2.5	Cont. PM2.5	PM10	Cont. PM10	SO2	NO2	NOy	CO	O3	Pb	VOC	Carbonyl	PAH	PM2.5 Spec.	Carbon Spec.	Black Carbon	RadNet	Met
21-067-0012	650 Newtown Pike		1[S,i]	1[m]		1[e]	1[e,r]			1[i,e,M]								1	
Fayette	Lexington																		
21-113-0001	260 Wilson Drive		1[S,i]			1				1[i]									
Jessamine	Nicholasville																		
Totals	**2**		**2**	**1**		**2**	**1**			**2**								**1**	

Tallies are equal to the actual number of monitors present. Superscripts represent additional information about the network.

i =AQI
m =PM10 Filter Analyzed for Metals
r =RA-40 Monitor
e =Emergency Episode Monitor
S =Continuous T640 Monitor
M =Maximum Ozone Concentration Site for MSA

CSA/MSA: Lexington-Fayette--Richmond--Frankfort, KY CSA; Lexington-Fayette, KY MSA
401 KAR 50:020 Air Quality Region: Bluegrass Intrastate (102)
Site Name: Lexington Primary (Newtown)
AQS Site ID: 21-067-0012
Location: Fayette County Health Department, 650 Newtown Pike, Lexington, KY 40508
County: Fayette
GPS Coordinates: 38.065056, -84.497556 (NAD 83)
Date Established: November 8, 1979
Inspection Date: November 21, 2024
Inspection By: Nall
Site Approval Status: Site and monitors meet all design criteria for the monitoring network.

The monitoring site is a stationary equipment shelter located on the grounds of the Fayette County Health Department building in Lexington, Kentucky. The sample inlets are 132 meters from the nearest road. Upon inspection, the sample lines and monitors were found to be in good condition. The site meets the requirements of 40 CFR 58, Appendices A, C, D, E and G.

Monitoring Objective:
The monitoring objectives are to determine compliance with National Ambient Air Quality Standards; to detect elevated pollutant levels for activation of emergency control procedures for nitrogen dioxide, ozone, particulates, and sulfur dioxide; and to provide pollutant levels for daily air quality index reporting.

Additionally, the nitrogen dioxide monitor has been approved as a RA-40 monitor. According to CFR, each EPA Regional Administrator is required to collaborate with agencies to establish or designate 40 NO_2 monitoring locations, with a primary focus on protecting susceptible and vulnerable populations.

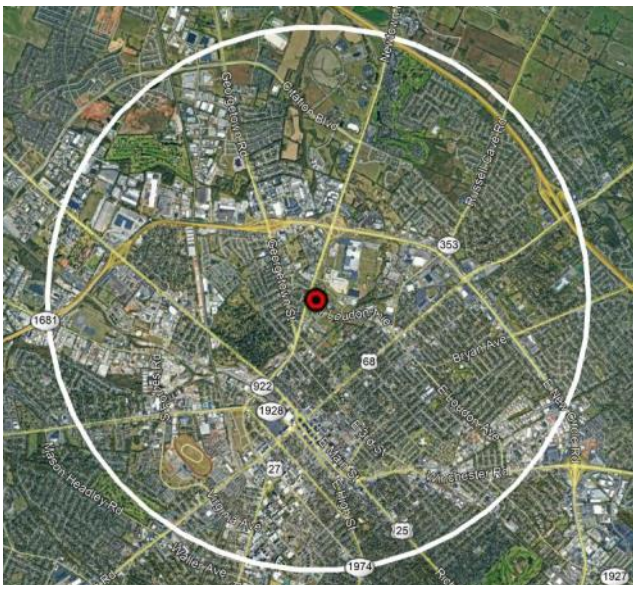
Monitors				
Monitor Type	**Inlet Height (meters)**	**Designation**	**Analysis Method**	**Frequency of Sampling**
AEM Ozone	4.0	SLAMS AQI EPISODE Maximum O^3	UV photometry	Continuously March 1 – October 31
AEM Nitrogen Dioxide (NO_2, NO, NO_x)	4.0	SLAMS (RA-40) EPISODE	Chemiluminescence	Continuously
AEM Sulfur Dioxide	3.98	SLAMS EPISODE	UV fluorescence	Continuously
FEM $PM_{2.5}$ Continuous	4.87	SLAMS AQI	Broadband Spectroscopy	Continuously

Monitors (Continued)				
PM_{10}	4.71	SLAMS	Gravimetric	24-hours every sixth day
- PM_{10} Metals		SPM-Other	Determined from the PM_{10} sample using EPA method IO 3.5	Same as PM_{10}
Radiation	1.3	RadNet	RadNet fixed stationary monitor, manual and automated methods	Continuously & 2 weekly filters

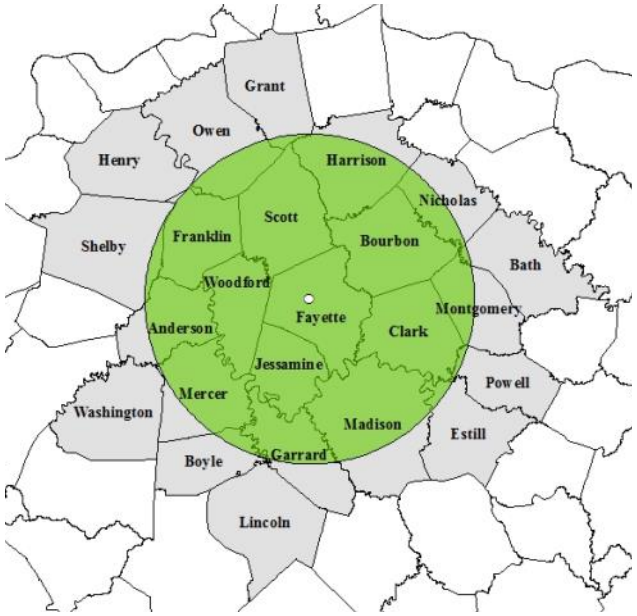
Quality Assurance Status:
All quality assurance procedures have been implemented in accordance with 40 CFR 58, Appendix A.

Area Representativeness:
This site represents population exposure on a neighborhood scale for particulates, sulfur dioxide and ozone. This site also represents population exposure on an urban scale for nitrogen dioxide.

Neighborhood Scale: Particulates, Sulfur



Urban Scale: Nitrogen Dioxide



CSA/MSA: Lexington-Fayette--Richmond--Frankfort, KY CSA; Lexington-Fayette, KY MSA
401 KAR 50:020 Air Quality Region: Bluegrass Intrastate (102)
Site Name: Nicholasville
AQS Site ID: 21-113-0001
Location: KYTC Maintenance Garage, 260 Wilson Drive, Nicholasville, KY 40356
County: Jessamine
GPS Coordinates: 37.89147, -84.58825 (NAD 83)
Date Established: August 1, 1991
Inspection Date: November 21, 2024
Inspection By: Nall
Site Approval Status: Site and monitors meet all design criteria for the monitoring network.

The monitoring site is a stationary equipment shelter located on the grounds of the Kentucky Transportation Cabinet garage in Nicholasville, Kentucky. The sample inlets are 82 meters from the nearest road. Upon inspection, the sample inlets and monitors were found to be in good condition. The site meets the requirements of 40 CFR 58, Appendices A, C, D, E, and G.

Monitoring Objective:
The monitoring objectives are to determine compliance with National Ambient Air Quality Standards and to provide ozone data upwind of the Lexington area.

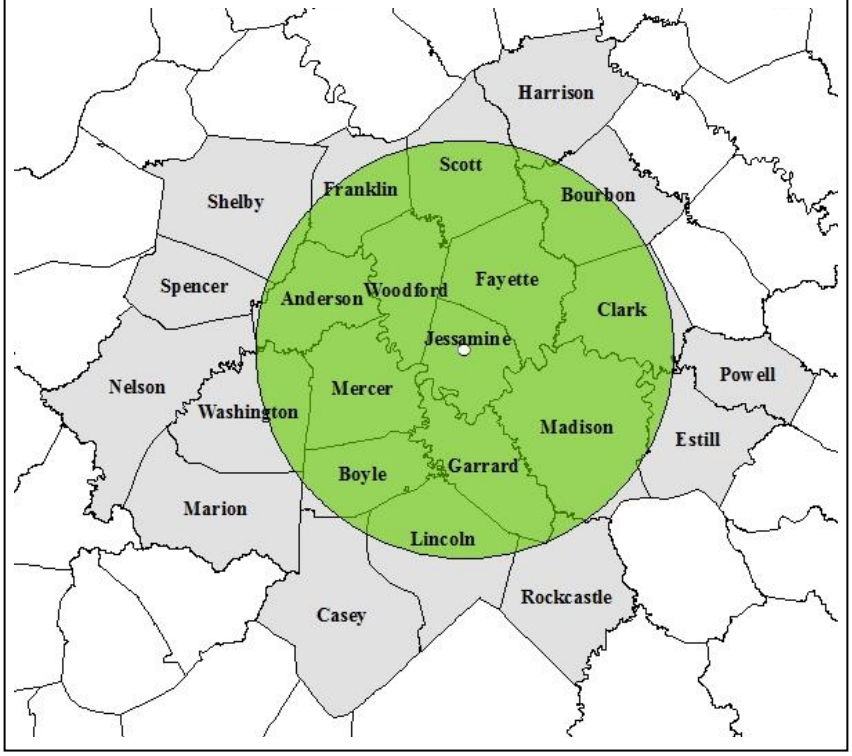
Monitors				
Monitor Type	**Inlet Height (meters)**	**Designation**	**Analysis Method**	**Frequency of Sampling**
AEM Ozone	3.9	SLAMS AQI	UV photometry	Continuously March 1 – October 31
AEM Sulfur Dioxide	3.91	SLAMS	UV fluorescence	Continuously
FEM $PM_{2.5}$ Continuous	4.58	SLAMS AQI	Broadband Spectroscopy	Continuously

Quality Assurance Status:
All Quality Assurance procedures have been implemented in accordance with 40 CFR 58, Appendix A.

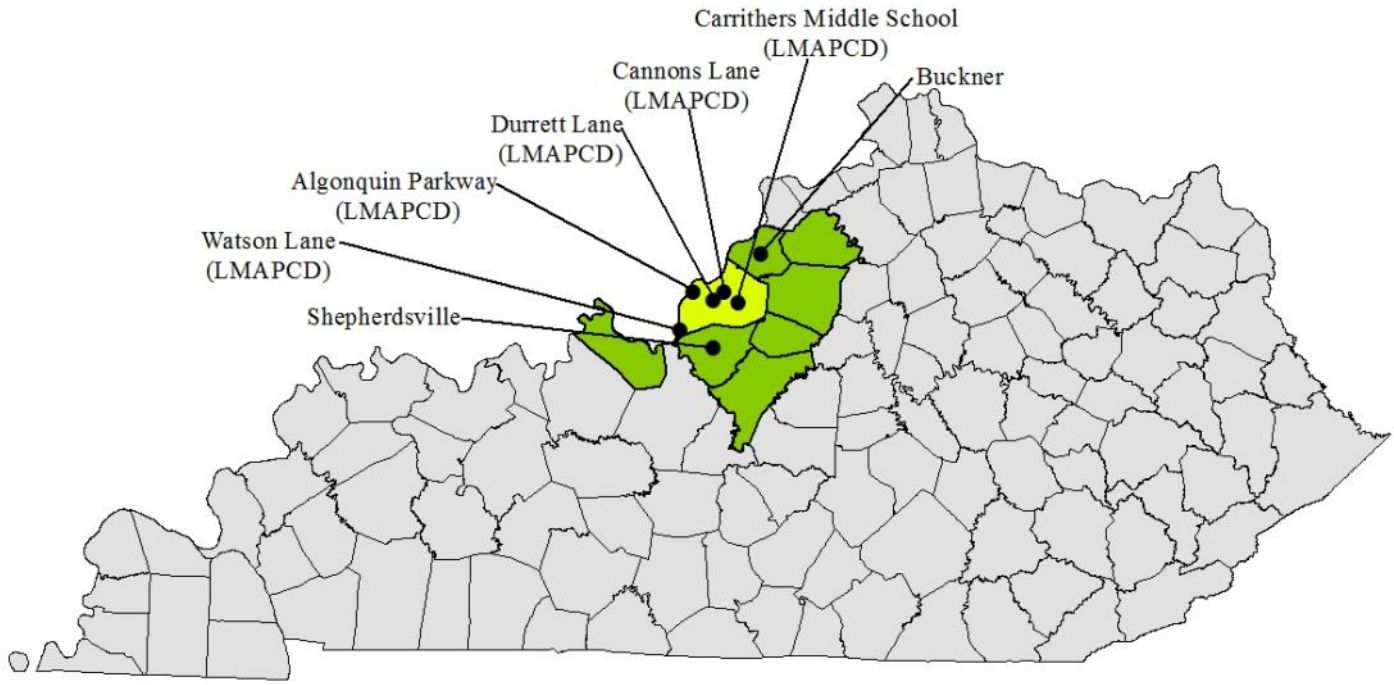
Area Representativeness:
The site represents population exposure on a neighborhood scale for particulates. This site also represents population exposure on an urban scale for ozone and sulfur dioxide.

Neighborhood Scale: Particulates

Urban Scale: Ozone and Sulfur Dioxide



Louisville/Jefferson County, KY-IN



AQS ID / County	Site Address	PM2.5	Cont. PM2.5	PM10	Cont. PM10	SO2	NO2	NOy	CO	O3	Pb	VOC	Carbonyl	PAH	PM2.5 Spec.	Carbon Spec.	Black Carbon	H_2S	RadNet	Met
21-029-0006	2nd & Carpenter St									1[i]										
Bullitt	Shepherdsville																			
21-185-0004	1601 South Hwy 393									1[i]										
Oldham	LaGrange																			
21-111-0051	7201 Watson Ln		1[i,S,*]			1[i]				1[i]										1
Jefferson	Louisville (LMAPCD)																			
21-111-0067	2730 Cannons Ln	1[C]	1[i,E,*]		1[i,E]	1[i]	1[i]	1	1[i]	1[i,M]		1[G]	1		1	1			1	1
Jefferson	Louisville (LMAPCD)																			
21-111-0075	1517 Durrett Ln	1[n,C]	1[S,n,i,*]				1[n,i]		1[n,i]								1[n]			1[n]
Jefferson	Louisville (LMAPCD)																			
21-111-0080	4320 Billtown Rd		1[i,*,S]							1[i]										1
Jefferson	Louisville (LMAPCD)																			
21-111-1041	4201 Algonquin Pkwy		1[i,S*]		1[i,S]	1[i]				1[i]		1[G]						1		1
Jefferson	Louisville (LMAPCD)																			
Totals	**7**	**2**	**5**		**2**	**3**	**2**	**1**	**2**	**6**		**2**	**1**		**1**	**1**	**1**	**1**	**1**	**5**

Tallies are equal to the actual number of parameters currently monitored. Superscripts represent additional information about the network.

C =Collocated
G =Auto GC
S =Continuous T640 Monitor
i =AQI Reported
* =Eligible for PM2.5 NAAQS Comparisons
n =Near-Road Monitor
M =Maximum Ozone Concentration Site for MSA
E =Continuous PM2.5-PM10 T640x-Coarse; (T640x samples for PM_{10}, $PM_{2.5}$, and PM_{coarse} with a single monitor)

CSA/MSA: Louisville/Jefferson County--Elizabethtown, KY-IN CSA; Louisville/Jefferson County, KY-IN MSA
401 KAR 50:020 Air Quality Region: North Central Kentucky Intrastate (104)
Site Name: Shepherdsville
AQS Site ID: 21-029-0006
Location: East Joe B. Hall Avenue & Carpenter Streets, Shepherdsville, KY 40165
County: Bullitt
GPS Coordinates: 37.986275, -85.711899 (NAD 83)
Date Established: January 30, 1992
Inspection Date: December 6, 2024
Inspection By: Nall and Bray
Site Approval Status: Site and monitors meet all design criteria for the monitoring network.

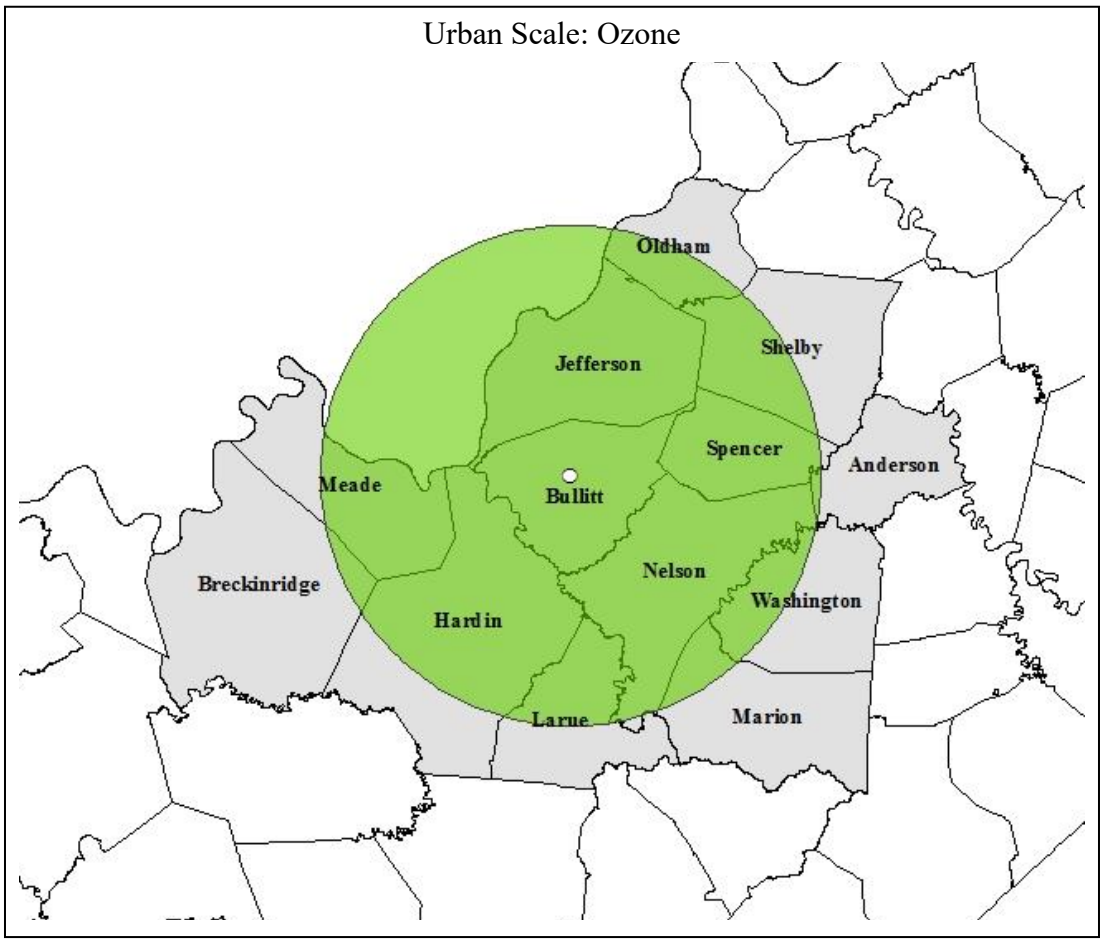
The monitoring site is a stationary equipment shelter located in a fenced-in area near the intersection of Second and Carpenter Streets in Shepherdsville, Kentucky. The sample inlets are 58 meters from the nearest road. Upon inspection, the sample lines and monitors were found to be in good condition. The site meets the requirements of 40 CFR 58, Appendices A, C, D, E, and G.

Monitoring Objective:
The monitoring objectives are to determine compliance with National Ambient Air Quality Standards.

Monitors				
Monitor Type	**Inlet Height (meters)**	**Designation**	**Analysis Method**	**Frequency of Sampling**
AEM Ozone	3.96	SLAMS AQI	UV photometry	Continuously March 1 – October 31

Quality Assurance Status:
All Quality Assurance procedures have been implemented in accordance with 40 CFR 58, Appendix A.

Area Representativeness:
This site represents population exposure on an urban scale for ozone.



CSA/MSA: Louisville/Jefferson County--Elizabethtown, KY-IN CSA; Louisville/Jefferson County, KY-IN MSA
401 KAR 50:020 Air Quality Region: North Central Kentucky Intrastate (104)
Site Name: Buckner
AQS Site ID: 21-185-0004
Location: KYTC Maintenance Facility, 1601 South Hwy 393, LaGrange, KY 40031
County: Oldham
GPS Coordinates: 38.4001911, -85.444291 (NAD 83)
Date Established: May 1, 1981
Inspection Date: December 6, 2024
Inspection By: Nall and Bray
Site Approval Status: Site and monitor meet all design criteria for the monitoring network.

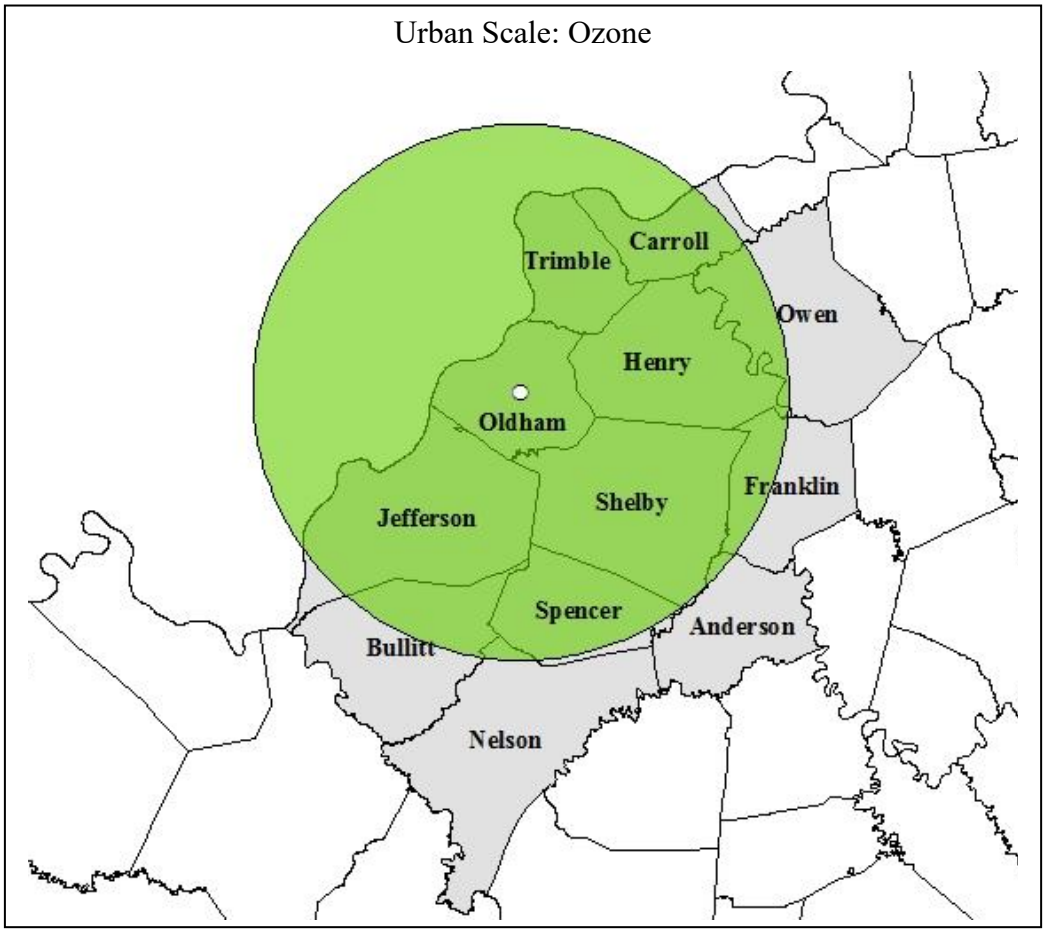
The monitoring site is a stationary equipment shelter located on the grounds of the Kentucky Transportation Cabinet Highway garage in Buckner, Kentucky. The sample inlet is 51 meters from the nearest road. Upon inspection, the sample line and monitor were found to be in good condition. The site meets the requirements of 40 CFR 58, Appendices A, C, D, E, and G.

Monitoring Objective:
The monitoring objectives are to determine compliance with National Ambient Air Quality Standards.

Monitors				
Monitor Type	**Inlet Height (meters)**	**Designation**	**Analysis Method**	**Frequency of Sampling**
AEM Ozone	3.93	SLAMS AQI	UV photometry	Continuously March 1 – October 31

Quality Assurance Status:
All Quality Assurance procedures have been implemented in accordance with 40 CFR 58, Appendix A.

Area Representativeness:
This site represents maximum concentrations on an urban scale.



CSA/MSA: Louisville/Jefferson County--Elizabethtown, KY-IN CSA; Louisville/Jefferson County, KY-IN MSA
401 KAR 50:020 Air Quality Region: Louisville Interstate (078)
Site Name: Watson Lane
AQS Site ID: 21-111-0051
Location: 7201 Watson Lane, Louisville, KY 40272
County: Jefferson
GPS Coordinates: 38.06091, -85.89804 (NAD 83)
Date Established: July 16, 1992
Inspection Date: October 24, 2024
Inspection By: APCD Quality Assurance Staff
Site Approval Status: Site and monitors meet all design criteria for the monitoring network.

The monitoring site is a stationary equipment shelter located on the grounds of the former Watson Lane Elementary School in Louisville, Kentucky. The site is situated in the southwestern portion of Louisville and is located approximately 1.5 km to the northeast of the LG&E Mill Creek Power Plant. This site serves as the maximum concentration site for Sulfur Dioxide, provides representative measurements of $PM_{2.5}$, and also serves as a downwind representation of ozone from the urban core under northeasterly flows.

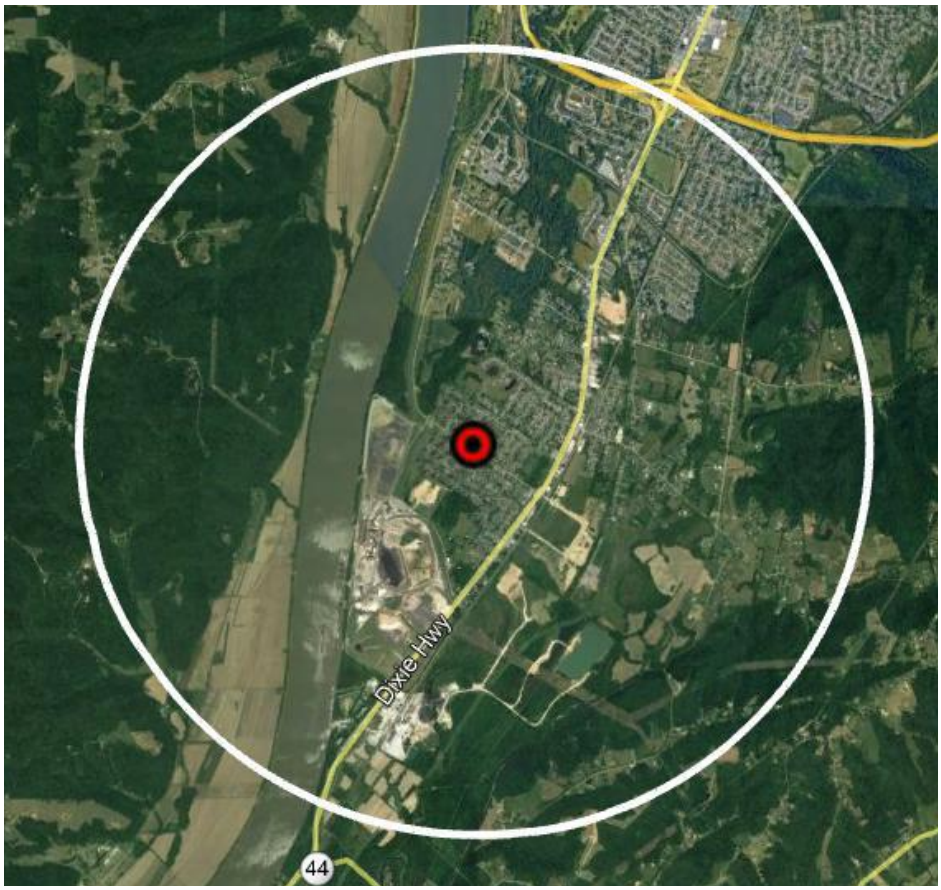
Monitoring Objective:
The monitoring objectives are to determine compliance with National Ambient Air Quality Standards and to provide pollution levels for daily index reporting.

Monitors				
Monitor Type	**Inlet Height (meters)**	**Designation**	**Analysis Method**	**Frequency of Sampling**
AEM Ozone	3.1	SLAMS AQI	UV photometry	Continuously March 1 – October 31
FEM $PM_{2.5}$ Continuous	4.4	SLAMS AQI	Broadband Spectroscopy	Continuously
AEM Sulfur Dioxide	3.0	SLAMS AQI	UV fluorescence	Continuously
Meteorological	5.8	Other	AQM grade instruments for wind speed and wind direction.	Continuously

Quality Assurance Status:
All Quality Assurance procedures have been implemented in accordance with 40 CFR 58, Appendix A.

Area Representativeness:
This site represents population exposure on a neighborhood scale for ozone and particulates. This site also represents maximum concentrations on a neighborhood scale for SO_2.

Neighborhood Scale



CSA/MSA: Louisville/Jefferson County--Elizabethtown, KY-IN CSA; Louisville/Jefferson County, KY-IN MSA
401 KAR 50:020 Air Quality Region: Louisville Interstate (078)
Site Name: Cannons Lane (CLAMS)
AQS Site ID: 21-111-0067
Location: Bowman Field, 2730 Cannons Lane, Louisville, KY 40204
County: Jefferson
GPS Coordinates: 38.2288760, -85.654520 (NAD 83)
Date Established: July 1, 2008
Inspection Date: October 22 and 29, 2024
Inspection By: APCD Quality Assurance Staff
Site Approval Status: EPA SLAMS approval on December 22, 2008; EPA NCore approval on October 30, 2009. Aside from the damaged Met tower, site and monitors meet all design criteria for the monitoring network.

The site is located in the northeast quadrant of Jefferson County, about 9 km from the urban core of Metro Louisville. The site is adjacent to the Bowman Field Airport and the property is leased by LMAPCD. The site was originally established as a SLAMS site in 2008, became an NCore site in 2009, and became a PAMS site in 2021. In December 2010, a solar electric array was installed which was designed to produce approximately 6,300 kWh of electricity per year.

Monitoring Objective:

The NCore Network addresses the following monitoring objectives:

- timely reporting of data to the public through AIRNow, air quality forecasting, and other public reporting mechanisms
- support development of emission strategies through air quality model evaluation and other observational methods
- accountability of emission strategy progress through tracking long-term trends of criteria and non-criteria pollutants and their precursors
- support long-term health assessments that contribute to ongoing reviews of the National Ambient Air Quality Standards (NAAQS)
- compliance through establishing nonattainment/attainment areas by comparison with the NAAQS
- support multiple disciplines of scientific research, including public health, atmospheric, and ecological.

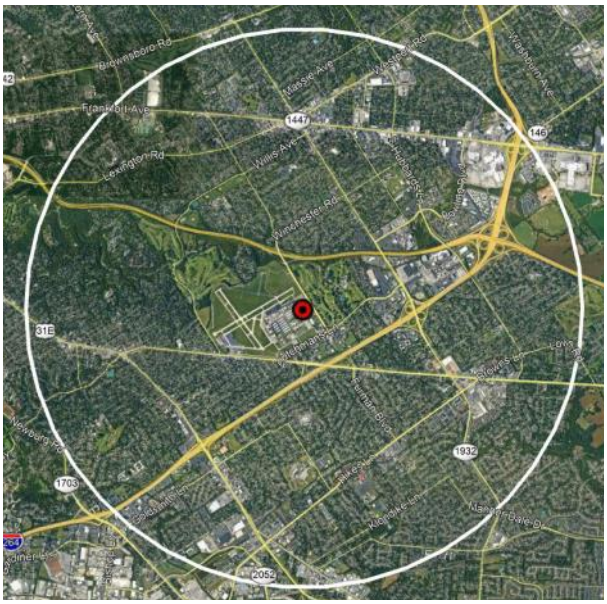
Monitors				
Monitor Type	**Inlet Height (meters)**	**Designation**	**Analysis Method**	**Frequency of Sampling**
Carbon Monoxide	3.8	NCore SLAMS AQI	Automated Reference Method utilizing trace level non-dispersive infrared analysis.	Continuously
Nitrogen Dioxide (NO_2)	3.8	NCore PAMS SLAMS AQI	Cavity Attenuated Phase Shift Spectrometry	Continuously
Total Reactive Nitrogen (NO/NO_y)	3.5	NCore PAMS	Automated method utilizing trace level chemiluminescence analysis.	Continuously
AEM Ozone	3.8	NCore PAMS SLAMS AQI Maximum O_3	UV photometry	Continuously
Sulfur Dioxide	3.8	NCore SLAMS AQI	Automated Equivalent Method utilizing trace level UV fluorescence analysis.	Continuously
FEM $PM_{2.5}$ and PM_{10} Continuous - PM_{Coarse} (PM_{10}-$PM_{2.5}$)	4.8	NCore SLAMS AQI	Broadband Spectroscopy	Continuously
$PM_{2.5}$ Speciation	2.0	NCore SLAMS	Multi-Species manual collection method utilizing thermal optical ion chromatography, gravimetric, and X-ray fluorescence.	24-hours every third day
$PM_{2.5}$ Carbon Speciation	2.2	NCore SLAMS	Multi-species manual collection method utilizing thermal optical and gravimetric analyses.	24-hours every third day
FRM $PM_{2.5}$ Collocated	4.6	NCore SLAMS QA Collocated	Manual reference method utilizing gravimetric analysis	24-hours every third day
Volatile Organic Compounds	4.2	PAMS	Automatic gas chromatograph with flame ionization detection	Continuously
Carbonyls	4.2	PAMS	DNPH Cartridge using TO-11A analysis	Three 8-hour samples every third day June 1—August 31
Meteorological -Wind Speed and Direction	5.4	NCore PAMS	Air Quality Measurements approved instrumentation for wind speed, and wind direction.	Continuously
-Temperature and RH	2.6	NCore PAMS	Air Quality Measurements approved instrumentation for temperature and humidity.	Continuously
-Barometric Pressure	4.0	PAMS	Air Quality Measurements approved instrumentation for barometric pressure.	Continuously
-Ceilometer	4.0	PAMS	Pulsed diode laser light detection and ranging (LIDAR).	Continuously
-Solar Radiation	4.3	NCore PAMS	Air Quality Measurements approved instrumentation for solar radiation.	Continuously
-UV Solar	4.4	PAMS	Air Quality Measurements approved instrumentation for UV Solar.	Continuously
-Rain Gauge	1.4	NCore PAMS	Air Quality Measurements approved instrumentation for precipitation.	Continuously
Radiation	2.6	RadNet	RadNet fixed station air monitor, manual and automated methods	Continuously + 2 weekly filters

Quality Assurance Status:
All Quality Assurance procedures have been implemented in accordance with 40 CFR 58, Appendix A.

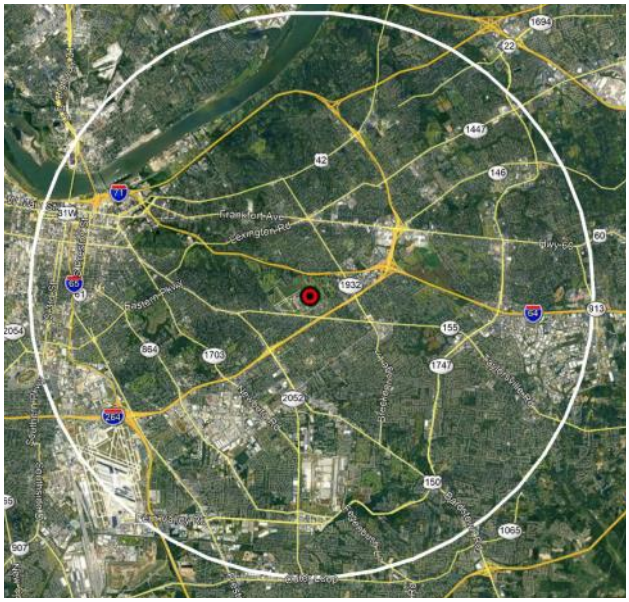
Area Representativeness:
The air monitoring equipment at the Cannon's Lane NCore station is specifically located at the urban and neighborhood scales. These scales are generally the most representative of the expected population exposures that occur throughout metropolitan areas.

Pollutant	Spatial Scale	Comments
Ozone	Neighborhood	4 km radius
Carbon Monoxide	Neighborhood Scale	4 km radius
Particulates	Neighborhood Scale	4 km radius
NO_x /NO_y	Neighborhood and Urban Scale	10 km radius
SO_2	Urban Scale	50 km radius
Radiation	Urban	50 km radius

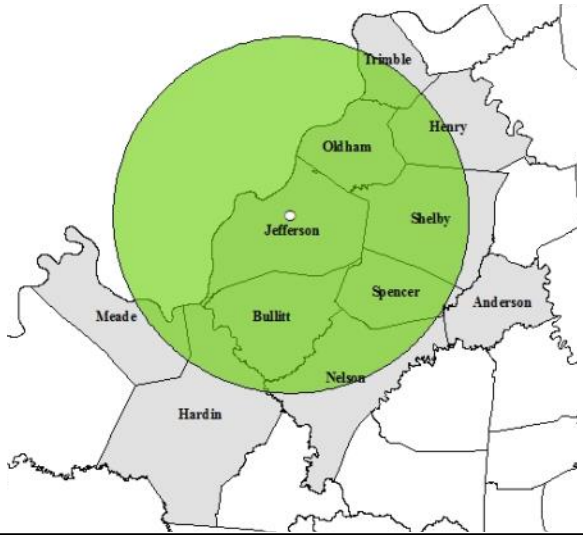
Neighborhood Scale:
Carbon Monoxide, Ozone, and Particulates



Neighborhood and Urban Scales (10 km radius):
Nitrogen Oxides



Urban Scale:
Sulfur Dioxide and Radiation



CSA/MSA: Louisville/Jefferson County--Elizabethtown, KY-IN CSA; Louisville/Jefferson County, KY-IN MSA
401 KAR 50:020 Air Quality Region: Louisville Interstate (078)
Site Name: Durrett Lane (Near Road)
AQS Site ID: 21-111-0075
Location: 1517 Durrett Lane, Louisville, KY 40213
County: Jefferson
GPS Coordinates: 38.193632, -85.711950 (NAD 83)
Date Established: January 1, 2014
Inspection Date: October 22, 2024
Inspection By: APCD Quality Assurance Staff
Site Approval Status: Aside from the lowered Met tower due to ongoing troubleshooting of Met equipment, site and monitors meet all design criteria for the monitoring network.

On February 9, 2010, the EPA released a new NO_2 Final Rule and a new set of monitoring requirements. Under the new monitoring requirements, State and Local agencies are required to establish near-road monitoring stations based upon core based statistical area (CBSA) populations and traffic metrics. The Louisville/Jefferson County, KY-IN MSA is required to establish not only a near-road nitrogen dioxide monitor, but also near-road $PM_{2.5}$ and carbon monoxide monitors. In response, LMAPCD has established a multi-pollutant near-road site that includes instrumentation to measure nitrogen dioxide, $PM_{2.5}$, carbon monoxide, and meteorology. The specific site was chosen following the development of a formal site proposal and a 30-day comment public period in April 2013. Data collection at the site began in January 2014. More information regarding near-road monitoring can be found in the appendices of this Annual Network Plan.

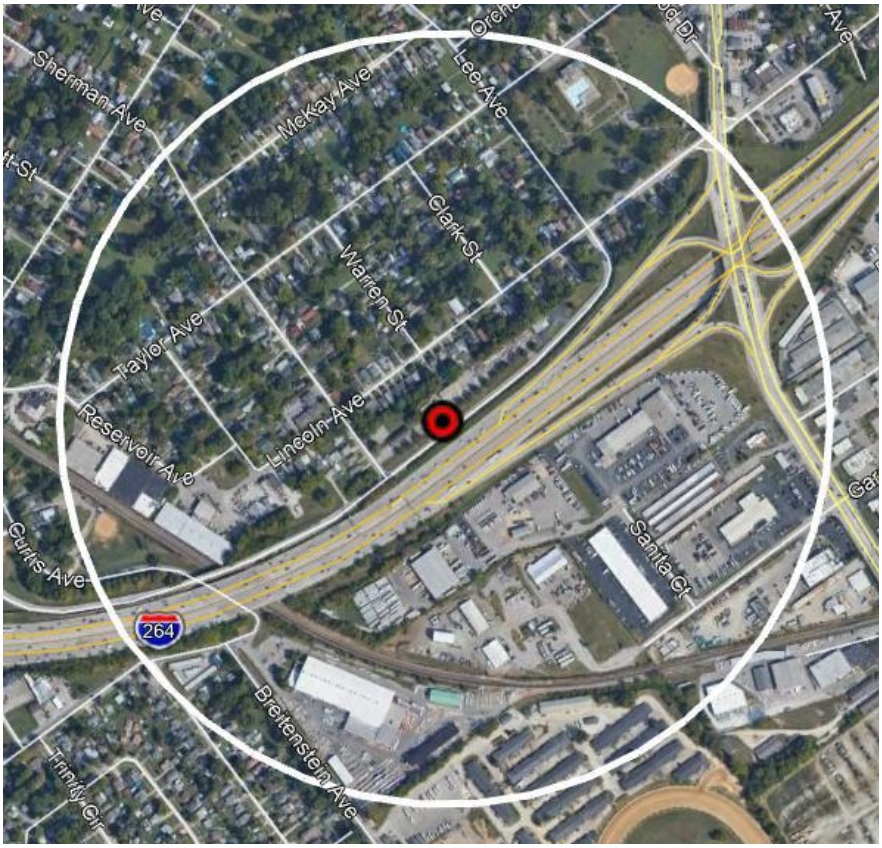
Monitoring Objective:
The monitoring objective will be to determine compliance with National Ambient Air Quality Standards for nitrogen dioxide, carbon monoxide, and particulate matter.

Monitors				
Monitor Type	**Inlet Height (meters)**	**Designation**	**Analysis Method**	**Frequency of Sampling**
AEM Nitrogen Dioxide (NO_2)	3.4	SLAMS AQI	Cavity Attenuated Phase Shift Spectroscopy	Continuously
Carbon Monoxide	3.4	SLAMS AQI	Automated Reference Method utilizing trace-level non-dispersive infrared analysis	Continuously
FEM $PM_{2.5}$ Continuous	4.2	SLAMS AQI	Broadband Spectroscopy	Continuously
FRM $PM_{2.5}$ Collocated	4.3	SLAMS	Manual Reference Method utilizing gravi-metric analysis	24-hours every third day
Meteorological - Wind Speed and Direction	5.2	Other	AQM grade instruments for wind speed and wind direction	Continuously
- Temperature and RH	3.8	Other	AQM grade instruments for temperature and humidity	Continuously
Black Carbon	4.0	SPM	Wavelength Dual Spot Optical Absorption	Continuously

Quality Assurance Status:
All Quality Assurance procedures have been implemented in accordance with 40 CFR 58, Appendix A.

Area Representativeness:
The site represents maximum concentrations on a middle scale.

Middle Scale: Carbon Monoxide, Nitrogen Dioxide and Particulates



CSA/MSA: Louisville/Jefferson County--Elizabethtown, KY-IN CSA; Louisville/Jefferson County, KY-IN MSA
401 KAR 50:020 Air Quality Region: Louisville Interstate (078)
Site Name: Carrithers Middle School
AQS Site ID: 21-111-0080
Location: 4320 Billtown Road, Louisville, KY 40291
County: Jefferson
GPS Coordinates: 38.182435, -85.574361 (WGS)
Date Established: January 9, 2018
Inspection Date: October 24, 2024
Inspection By: APCD Quality Assurance Staff
Site Approval Status: Site and monitors meet all design criteria for the monitoring network.

Due to Jefferson County Public School's plan for significant modification to the Bates Elementary property, the Bates site was retired in early 2018. A new site was established on the grounds of Carrithers Middle School, which is located three miles to the north of the Bates Elementary School site. The instrumentation from Bates was transferred to Carrithers and the new site became operational on 1/9/2018.

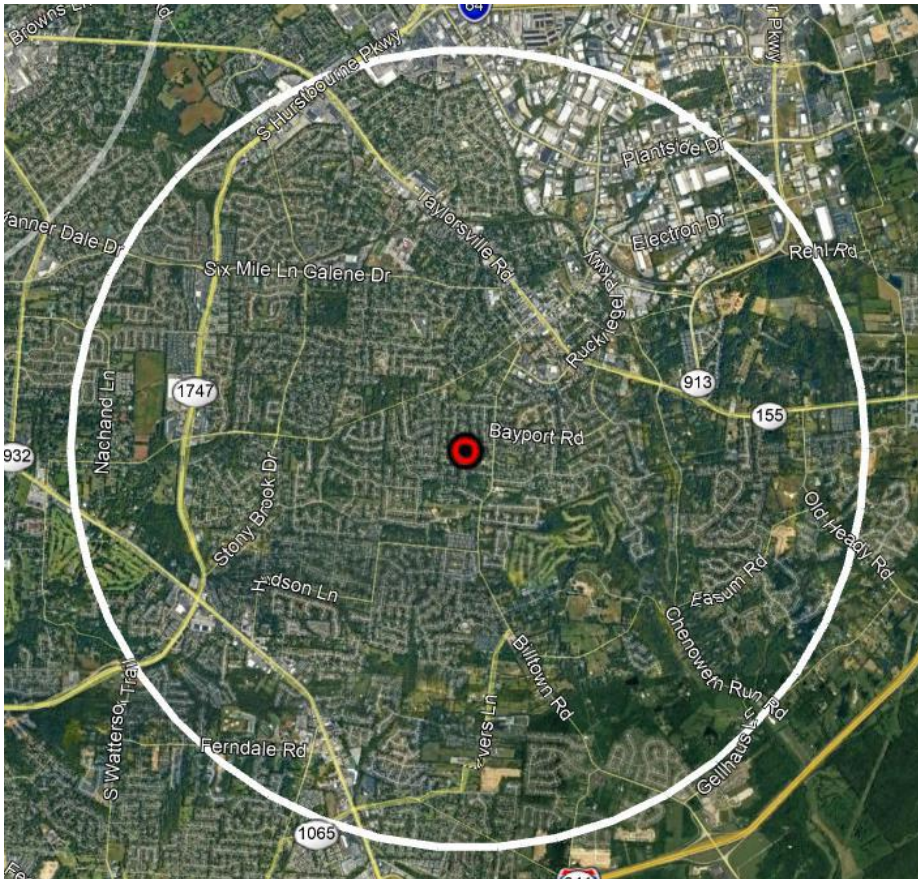
Monitoring Objective:
The monitoring objectives are to determine compliance with National Ambient Air Quality Standards and to provide pollution levels for daily index reporting.

Monitors				
Monitor Type	**Inlet Height (meters)**	**Designation**	**Analysis Method**	**Frequency of Sampling**
AEM Ozone	3.6	SLAMS AQI	UV photometry	Continuously March 1 – October 31
FEM $PM_{2.5}$ Continuous	4.4	SLAMS AQI	Broadband Spectroscopy	Continuously
Meteorological -Wind Speed and Direction	6.0	Other	AQM grade instruments for wind speed and wind direction.	Continuously
- Temperature and RH	4.2	Other	AQM grade instruments for temperature and humidity.	Continuously

Quality Assurance Status:
All Quality Assurance procedures have been implemented in accordance with 40 CFR 58, Appendix A.

Area Representativeness:
This site represents population exposure on a neighborhood scale for ozone and fine particulates.

Neighborhood Scale: Particulates and Ozone



CSA/MSA: Louisville/Jefferson County--Elizabethtown, KY-IN CSA; Louisville/Jefferson County, KY-IN MSA
401 KAR 50:020 Air Quality Region: Louisville Interstate (078)
Site Name: Algonquin Parkway
AQS Site ID: 21-111-1041
Location: 4201 Algonquin Parkway, Louisville, KY 40211
County: Jefferson
GPS Coordinates: 38.23158, -85.82675 (NAD 83)
Date Established: April 13, 1978
Inspection Date: October 28, 2024
Inspection By: APCD Quality Assurance Staff
Site Approval Status: Site and monitor meet all design criteria for the monitoring network.

The monitoring site is a stationary equipment shelter located on the grounds of the Firearms Training Center in Louisville, Kentucky. The site is situated in West Louisville and is located directly to the northeast of the Rubbertown industrial area. LMAPCD replaced the existing shelter with a new, larger shelter in September, 2017 to house a continuous Toxics Monitor (Auto GC) and to accommodate additional instruments that were transferred from the nearby Southwick Community Center site (now retired). Additional particulate and gaseous instruments have been installed at the Algonquin Parkway site since 2017, which has allowed for a better characterization of air quality and meteorological conditions in West Louisville. The name of this site was changed from Firearms Training to Algonquin Parkway in 2020.

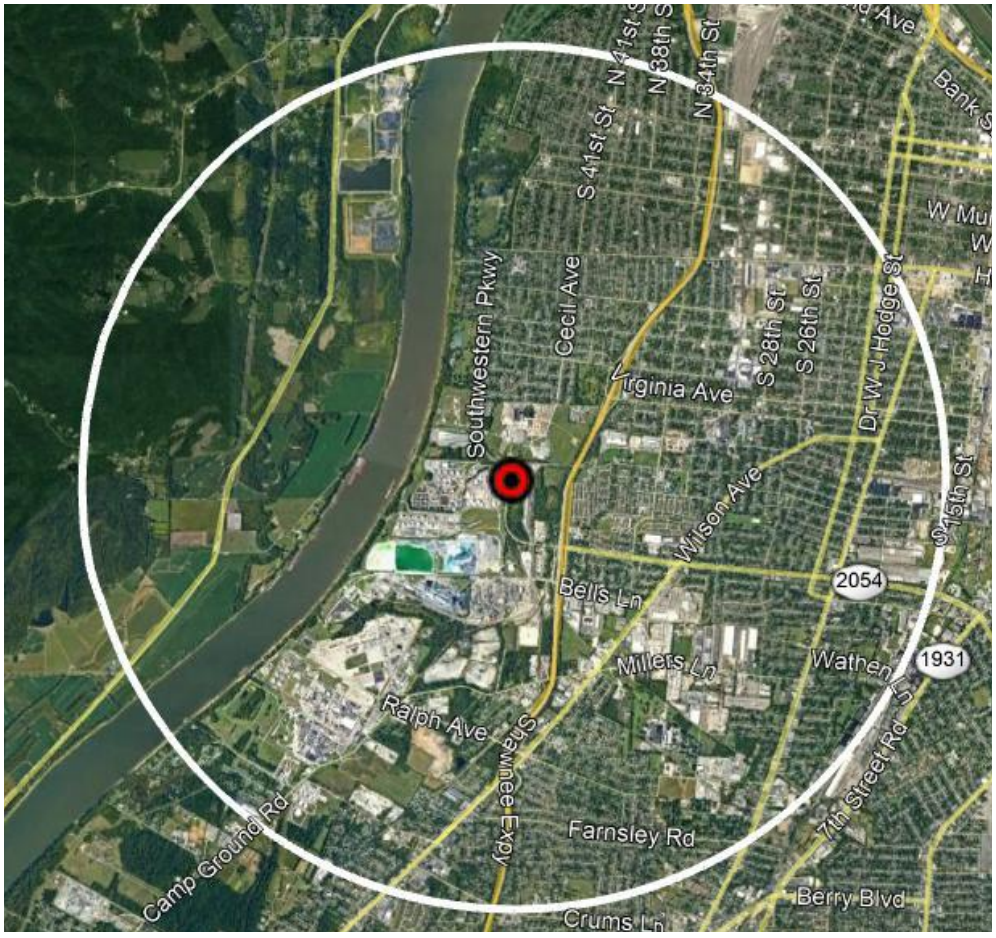
Monitoring Objective:
The monitoring objectives are to determine compliance with National Ambient Air Quality Standards, to provide pollution levels for daily index reporting, and to characterize VOC concentrations.

Monitors				
Monitor Type	**Inlet Height (meters)**	**Designation**	**Analysis Method**	**Frequency of Sampling**
AEM Ozone	3.6	SLAMS AQI	UV Photometry	Continuously March 1 – October 31
FEM $PM_{2.5}$ and PM_{10} Continuous	4.2	SLAMS AQI	Broadband Spectroscopy	Continuously
AEM Sulfur Dioxide	3.8	SLAMS AQI	UV Fluorescence	Continuously
Volatile Organic Carbon	3.7	SPM	Automatic gas chromatograph with flame ionization detection	Continuously
Hydrogen Sulfide	3.7	SPM	UV Fluorescence	Continuously
Meteorological -Wind Speed and Direction	9.0	SLAMS	AQM grade instruments for wind speed and wind direction	Continuously
- Temperature and RH	1.9	SLAMS	AQM grade instruments for temperature and humidity	Continuously

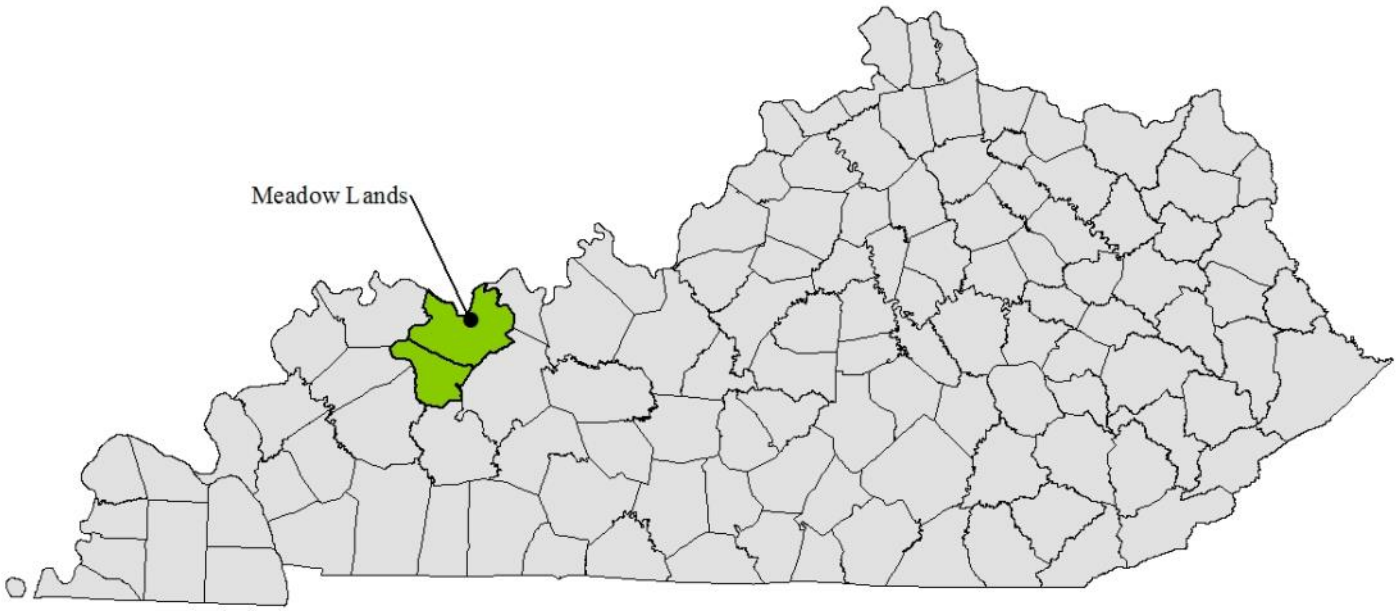
Quality Assurance Status:
All Quality Assurance procedures have been implemented in accordance with 40 CFR 58, Appendix A.

Area Representativeness:
This site represents population exposure on a neighborhood scale for particulates, ozone, and sulfur dioxide.

Neighborhood Scale: Particulates, Ozone, and Sulfur Dioxide



Owensboro, KY



AQS ID / County	Site Address	PM2.5	Cont. PM2.5	PM10	Cont. PM10	SO2	NO2	NOy	CO	O3	Pb	VOC	Carbonyl	PAH	PM2.5 Spec.	Carbon Spec.	Black Carbon	RadNet	Met
21-059-0015	3500 Hayden Rd.		$1^{S,e,i}$			1^{e}	1^{e}			$1^{e,I,M}$									
Daviess	Owensboro																		
Totals	**1**		**1**			**1**	**1**			**1**									

Tallies are equal to the actual number of monitors present. Superscripts represent additional information about the network.

e =Emergency Episode Monitor

S =Continuous T640 Monitor

i =AQI Reported

M =Maximum Ozone Concentration Site for MSA

CSA/MSA: Owensboro, KY MSA
401 KAR 50:020 Air Quality Region: Evansville-Owensboro-Henderson Interstate (077)
Site Name: Meadow Lands (Owensboro)
AQS Site ID: 21-059-0015
Location: Meadow Lands Elementary School, 3500 Hayden Rd, Owensboro, KY 42303
County: Daviess
GPS Coordinates: 37.7716709, -87.0558193 (NAD 83)
Date Established: November 21, 2024
Inspection Date: October 22, 2024
Inspection By: Nall
Site Approval Status: Site and monitors meet all design criteria for the monitoring network.

The monitoring site is a stationary equipment shelter located on the grounds of Meadow Lands Elementary School. The sample inlets are 131 meters from the nearest road. The site meets requirements established by 40 CFR 58, Appendices A, C, D, E, and G. This site was previously Owensboro Primary (21-059-0005), which had to be relocated due to land development plans.

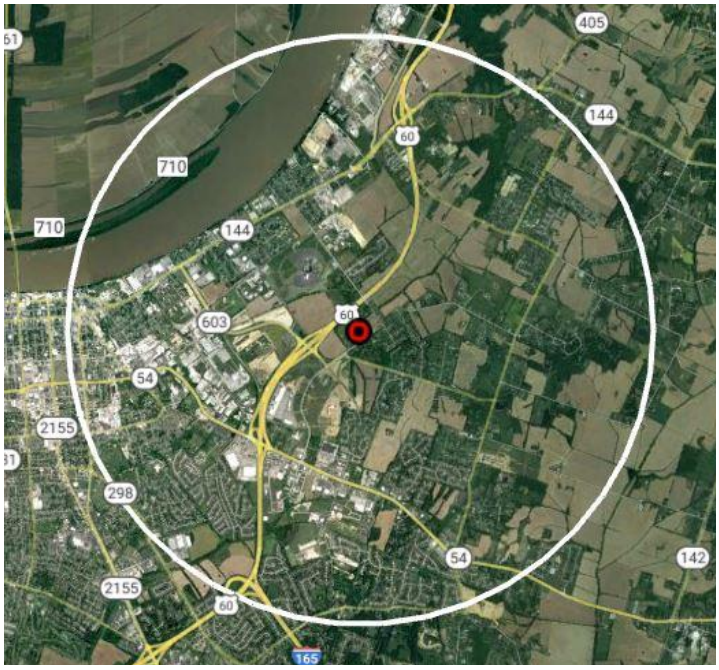
Monitoring Objective:
The monitoring objectives are to determine compliance with National Ambient Air Quality Standards; to detect emergency pollution levels of criteria pollutants for activation of emergency control procedures.

Monitors				
Monitor Type	**Inlet Height (meters)**	**Designation**	**Analysis Method**	**Frequency of Sampling**
AEM Nitrogen Dioxide (NO_2, NO, NO_x)	4.56	SLAMS EPISODE	Chemiluminescence	Continuously
AEM Ozone	4.55	SLAMS EPISODE Maximum O_3 AQI	UV photometry	Continuously March 1 – October 31
FEM $PM_{2.5}$ Continuous	4.58	SLAMS EPISODE AQI	Broadband Spectroscopy	Continuously
AEM Sulfur Dioxide	4.52	SLAMS EPISODE	UV fluorescence	Continuously

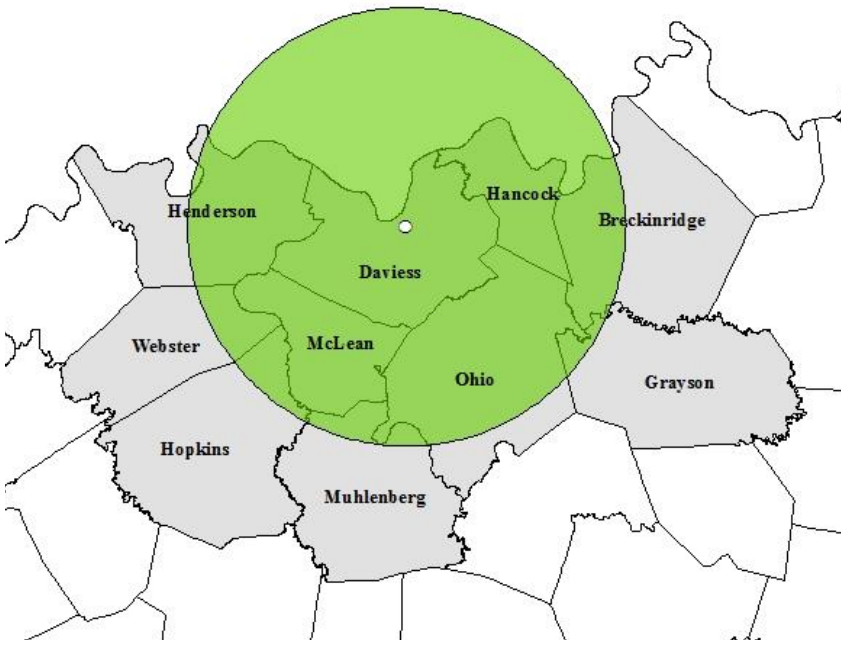
Quality Assurance Status:
All Quality Assurance procedures have been implemented in accordance with 40 CFR 58, Appendix A.

Area Representativeness:
This site represents population exposure on a neighborhood scale for particulates, ozone, and sulfur dioxide. This site also represents population exposure on an urban scale for nitrogen dioxide.

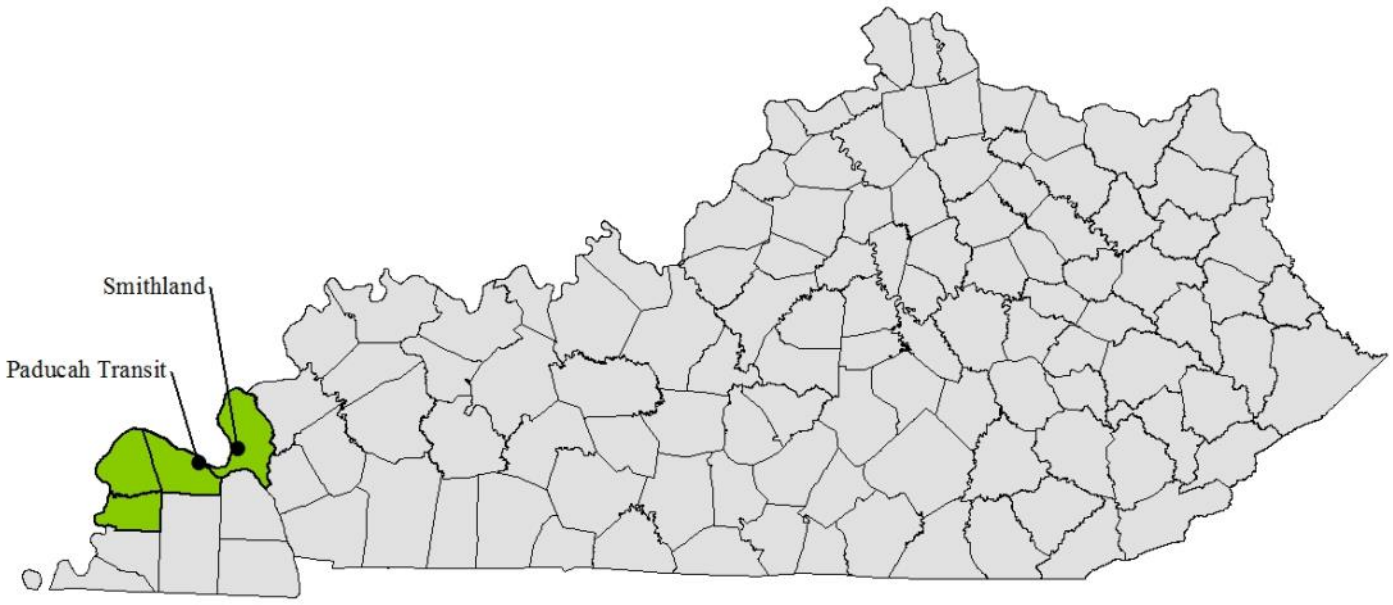
Neighborhood Scale: Ozone, Sulfur Dioxide, Particulates



Urban Scale: Nitrogen Dioxide



Paducah, KY-IL



AQS ID / County	Site Address	PM2.5	Cont. PM2.5	PM10	Cont. PM10	SO2	NO2	NOy	CO	O3	Pb	VOC	Carbonyl	PAH	PM2.5 Spec.	Carbon Spec.	Black Carbon	RadNet	Met
21-139-0002	706 State Drive									1[i,M]								1	
Livingston	Smithland																		
21-145-1027	920 Harrison Street		1[s,i]			1[e]	1[e]			1[e, i]									
McCracken	Paducah Transit																		
Totals	**2**		**1**			**1**	**1**			**2**									

Tallies are equal to the actual number of monitors present. Superscripts represent additional information about the network.

e =Emergency Episode Monitor

S =Continuous T640 Monitor

i =AQI Reported

M =Maximum Ozone Concentration Site for MSA

CSA/MSA: Paducah-Mayfield, KY-IL CSA; Paducah, KY-IL MSA
401 KAR 50:020 Air Quality Region: Paducah-Cairo Interstate (072)
Site Name: Smithland
AQS Site ID: 21-139-0003
Location: Livingston County Road Dept., 730 State Drive, Smithland, KY 42081
County: Livingston
GPS Coordinates: 37.155417, -88.393972 (NAD 83)
Date Established: April 1, 1988
Inspection Date: September 25, 2024
Inspection By: Nall
Site Approval Status: Site and monitors meet all design criteria for the monitoring network.

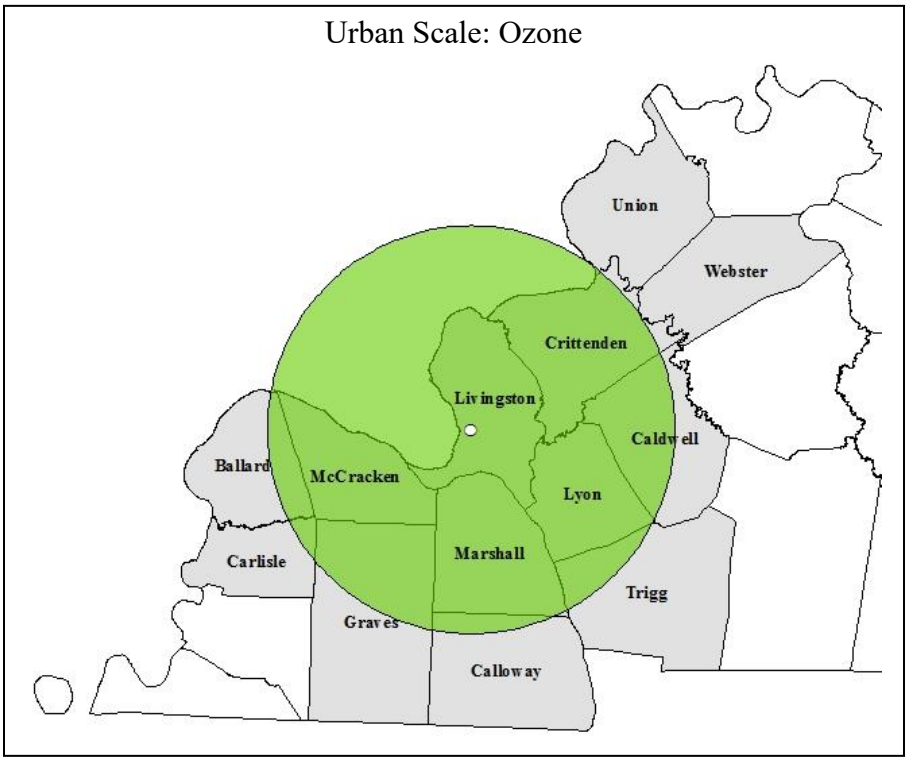
The monitoring site is a stationary equipment shelter located on the grounds of the Livingston County Road Dept. facility in Smithland, Kentucky. The sample inlets are 136 meters from the nearest road. Upon inspection, the sample lines and monitors were found to be in good condition. The site meets the requirements of 40 CFR 58, Appendices A, C, D, and E.

Monitoring Objective:
The monitoring objective is to determine compliance with National Ambient Air Quality Standards.

Monitors				
Monitor Type	**Inlet Height (meters)**	**Designation**	**Analysis Method**	**Frequency of Sampling**
AEM Ozone	3.87	SLAMS Maximum O_3 AQI	UV photometry	Continuously
Radiation	1.33	RadNet	RadNet fixed stationary monitor, manual and automated methods	Continuously & 2 weekly filters

Quality Assurance Status:
All Quality Assurance procedures have been implemented in accordance with 40 CFR 58, Appendix A.

Area Representativeness:
This site represents maximum concentrations on an urban scale.



CSA/MSA: Paducah-Mayfield, KY-IL CSA; Paducah, KY-IL MSA
401 KAR 50:020 Air Quality Region: Paducah-Cairo Interstate (072)
Site Name: Paducah Transit
AQS Site ID: 21-145-1027
Location: 920 Harrison Street, Paducah, KY 42001
County: McCracken
GPS Coordinates: 37.08727, -88.60801 (NAD 83)
Date Established: January 10, 2023
Inspection Date: September 25, 2024
Inspection By: Nall
Site Approval Status: Site and monitors meet design criteria for the monitoring network.

The monitoring site is a stationary equipment shelter located on the grounds of Paducah Area Transit System in Paducah, Kentucky. The sample inlets are 30 meters from the nearest road. The site meets the requirements established by 40 CFR 58, Appendices A, C, D, E, and G. This site was formally Jackson Purchase (21-145-1024). The property owners were expanding operations and the site had to be relocated as quickly as possible. Paducah Transit is 2.8 miles NW of the Jackson Purchase site.

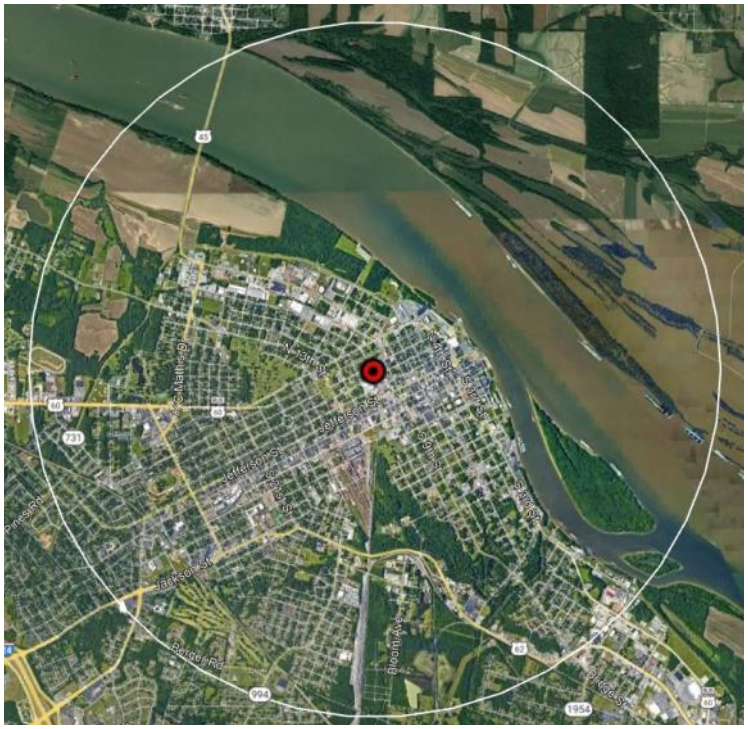
Monitoring Objective:
The monitoring objectives are to determine compliance with National Ambient Air Quality Standards and to detect elevated pollutant levels for activation of emergency control procedures for nitrogen dioxide, ozone, and sulfur dioxide. While not required for the CBSA, the site also provides pollutant levels for daily air quality index reporting.

Monitors				
Monitor Type	**Inlet Height (meters)**	**Designation**	**Analysis Method**	**Frequency of Sampling**
AEM Nitrogen Dioxide (NO_2, NO, NO_x)	4.27	SLAMS EPISODE	Chemiluminescence	Continuously
AEM Sulfur Dioxide	4.25	SLAMS EPISODE	UV fluorescence	Continuously
AEM Ozone	4.1	SLAMS AQI EPISODE	UV photometry	Continuously March 1 – October 31
FEM $PM_{2.5}$ Continuous	4.77	SLAMS AQI	Broadband Spectroscopy	Continuously

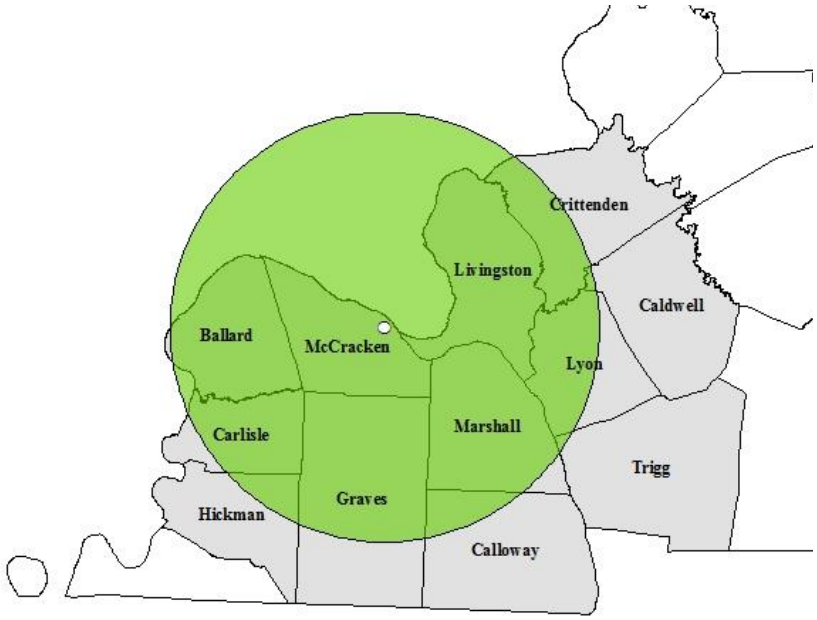
Quality Assurance Status:
All Quality Assurance procedures have been implemented in accordance with 40 CFR 58, Appendix A.

Area Representativeness:
This site represents population exposure on a neighborhood scale for ozone, particulates, and sulfur dioxide. This site also represents population exposure on an urban scale for nitrogen dioxide.

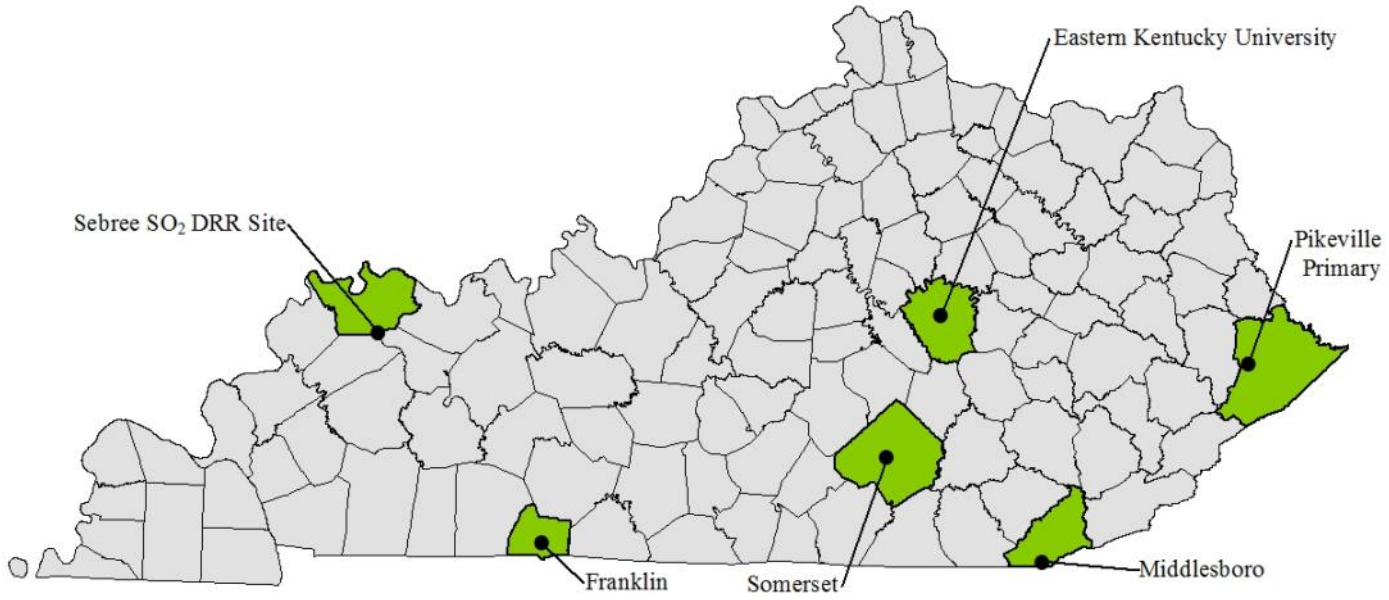
Neighborhood Scale: Ozone, Particulates, Sulfur Dioxide



Urban Scale: Nitrogen Dioxide



Micropolitan Statistical Areas



AQS ID / County	Site Address	PM2.5	Cont. PM2.5	PM10	Cont. PM10	SO2	NO2	NOy	CO	O3	Pb	VOC	Carbonyl	PAH	PM2.5 Spec.	Carbon Spec.	Black Carbon	RadNet	Met
21-013-0002	1420 Dorchester Ave.		$1^{i,S}$							1^{i}									
Bell	Middlesboro																		
21-101-1011	Alcan Aluminum Rd.					1^{DRR}													
Henderson	Robards, KY 42452																		
21-151-0005	Van Hoose Drive										2^{C}								
Madison	Richmond																		
21-195-0002	109 Loraine Street		$1^{S,i}$							1^{i}									
Pike	Pikeville																		
21-199-0003	305 Clifty Street		$1^{i,S}$							1^{i}									
Pulaski	Somerset																		
21-213-0004	573 Harding Road									1^{i}									
Simpson	Franklin																		
Totals			**3**			**1**				**4**	**2**								

Tallies are equal to the actual number of monitors present. Superscripts represent additional information about the network.

C =Collocated S =Continuous T640 Monitor

i =AQI Reported DRR =SO2 Data Requirements Rule Monitor

CSA/MSA: Middlesborough-Corbin, KY CSA; Middlesborough, KY Micropolitan Statistical Area
401 KAR 50:020 Air Quality Region: Appalachian Intrastate (101)
Site Name: Middlesboro
AQS Site ID: 21-013-0002
Location: Middlesboro Airport, 1420 Dorchester Avenue, Middlesboro, KY 40965
County: Bell
GPS Coordinates: 36.608475, -83.736939 (NAD 83)
Date Established: February 14, 1992
Inspection Date: October 3, 2024
Inspection By: Nall
Site Approval Status: Site and monitors meet all design criteria for the monitoring network.

The monitoring site is a stationary equipment shelter located on the grounds of the Middlesboro Airport in Middlesboro, Kentucky. The sample inlets are 96 meters from the nearest road. Upon inspection the sample lines and monitors were found to be in good condition. The site meets the requirements of 40 CFR 58, Appendices A, C, D, E and G.

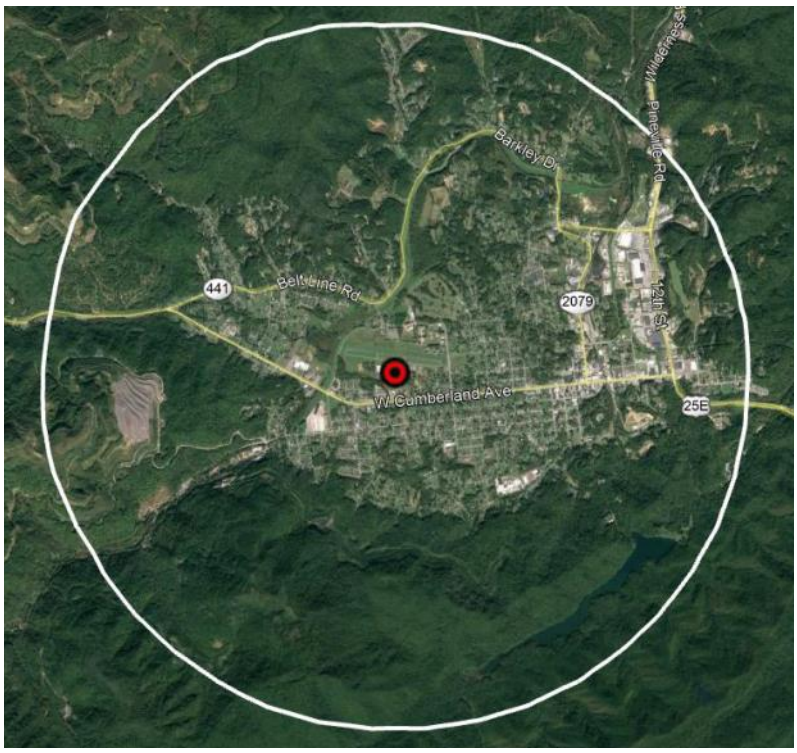
Monitoring Objective:
The monitoring objectives are to determine compliance with National Ambient Air Quality Standards and to provide information on the transport of ozone into the region.

Monitors				
Monitor Type	**Inlet Height (meters)**	**Designation**	**Analysis Method**	**Frequency of Sampling**
AEM Ozone	3.96	SLAMS AQI	UV photometry	Continuously March 1 – October 31
FEM $PM_{2.5}$ Continuous	4.86	SLAMS AQI	Broadband Spectroscopy	Continuously

Quality Assurance Status:
All Quality Assurance procedures have been implemented in accordance with 40 CFR 58, Appendix A.

Area Representativeness:
The site represents population exposure on a neighborhood scale for particulates and ozone.

Neighborhood Scale: Particulates & Ozone



CSA/MSA: Evansville-Henderson, IN-KY CSA; Henderson, KY Micropolitan Statistical Area
401 KAR 50:020 Air Quality Region: Evansville-Owensboro-Henderson Interstate (077)
Site Name: Sebree SO_2 DRR Site
AQS Site ID: 21-101-1011
Location: Alcan Aluminum Road
County: Henderson
GPS Coordinates: 37.654391, -87.511424 (NAD 83)
Date Established: January 1, 2017
Inspection Date: October 22, 2024
Inspection By: Nall
Site Approval Status: Site and monitor meet design criteria for the monitoring network.

On August 10, 2015, the EPA finalized requirements in 40 CFR 51, Subpart BB requiring air pollution control agencies to monitor ambient sulfur dioxide (SO_2) concentrations in areas with large sources of sulfur dioxide emissions in order to assist in the implementation for the one-hour SO_2 National Ambient Air Quality Standard (NAAQS). Known as the "Data Requirements Rule (DRR)," this action established that, at a minimum, agencies must characterize air quality around sources that emit 2,000 tons per year (tpy) or more of sulfur dioxide. The site meets the requirements of 40 CFR 58, Appendices A, C, D, and E.

As allowed by the DRR, an ambient air monitoring site has been established near Sebree, Kentucky, to characterize maximum hourly sulfur dioxide concentrations in the immediate vicinity of the Big Rivers Electric Corporation and Century Aluminum Sebree, LLC facilities. The site is located at the intersection of Alcan Aluminum Road and a facility coal-truck access road, approximately 1/2 mile south of State Route 2678.

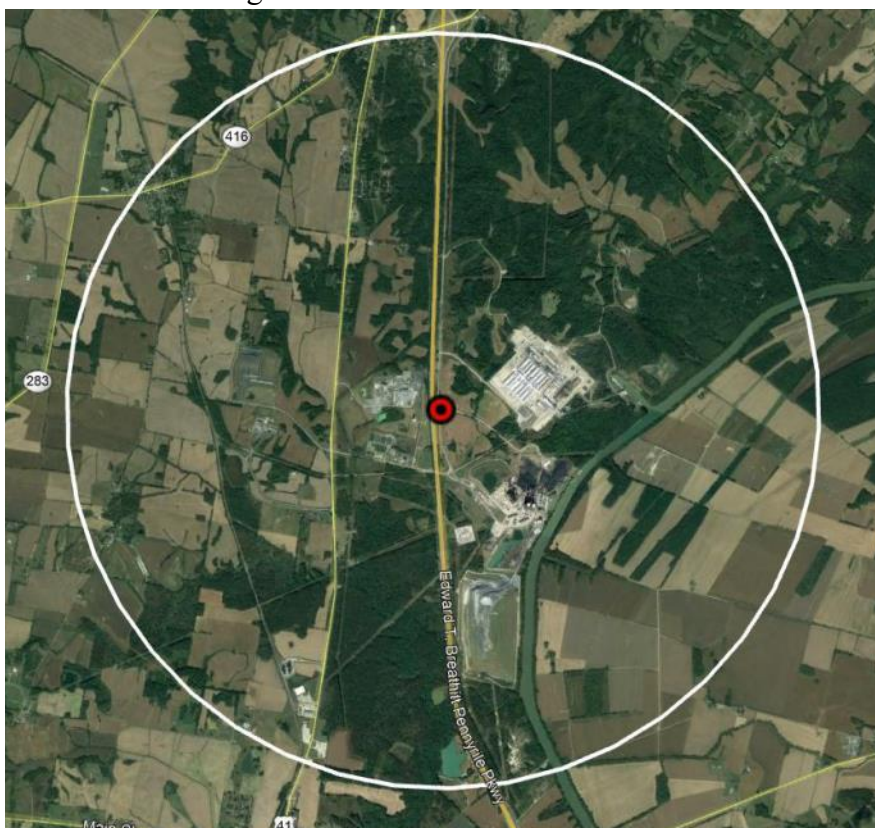
Monitoring Objective:
The monitoring objectives are to determine compliance with National Ambient Air Quality Standards.

Monitors				
Monitor Type	**Inlet Height (meters)**	**Designation**	**Analysis Method**	**Frequency of Sampling**
AEM Sulfur Dioxide	3.82	SLAMS	UV fluorescence	Continuously

Quality Assurance Status:
All Quality Assurance procedures have been implemented in accordance with 40 CFR 58, Appendix A.

Area Representativeness:
This site represents population exposure on a neighborhood scale for sulfur dioxide.

Neighborhood Scale: Sulfur Dioxide



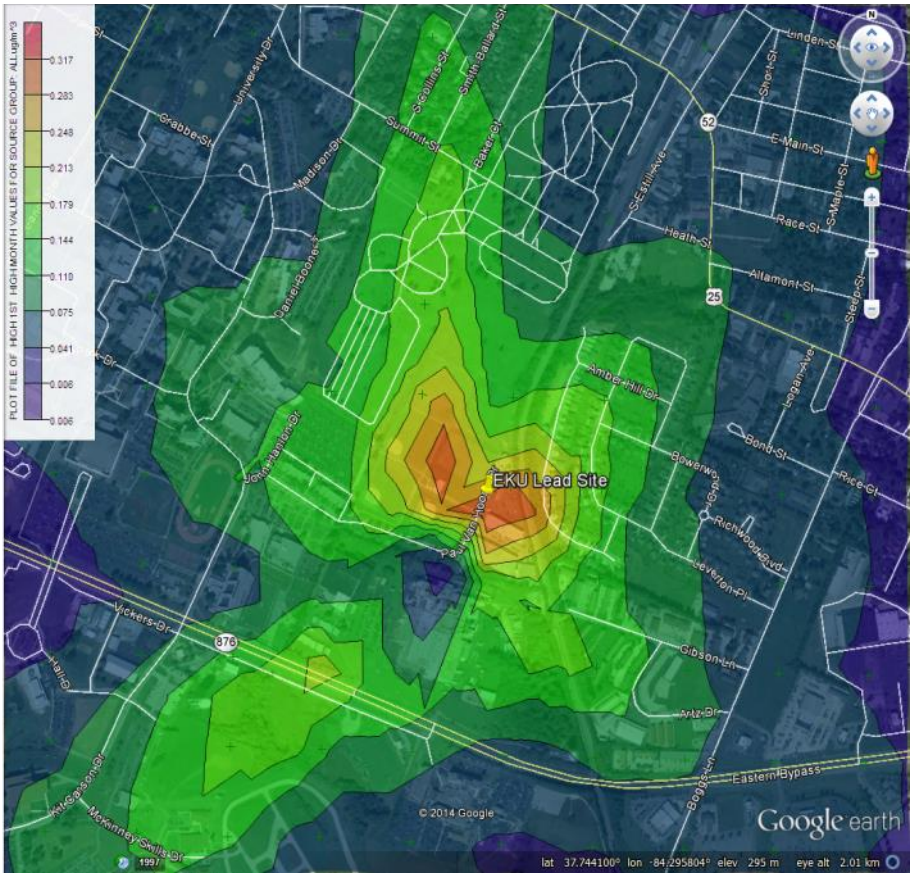
CSA/MSA: Lexington-Fayette--Richmond--Frankfort KY CSA; Richmond-Berea, KY Micropolitan Statistical Area
401 KAR 50:020 Air Quality Region: Bluegrass Intrastate (102)
Site Name: Eastern Kentucky University **(**EKU)
AQS Site ID: 21-151-0005
Location: Eastern Kentucky University, Van Hoose Drive, Richmond, KY 40475
County: Madison
GPS Coordinates: 37.73636, -84.29167 (NAD 83)
Date Established: March 10, 2012
Inspection Date: November 21, 2024
Inspection By: Nall
Site Approval Status: Site and monitors meet all design criteria for the monitoring network.

The site is located behind the Gentry Facilities Services building and is adjacent to Eastern Kentucky University's athletic fields. The sample inlets are 3.0 meters from the nearest road. Upon inspection, the sample inlet and monitor were found to be in good condition. The site meets the requirements of 40 CFR 58, Appendices A, C, D and E.

Monitoring Objective:
The monitoring objectives are to determine compliance with National Ambient Air Quality Standards.

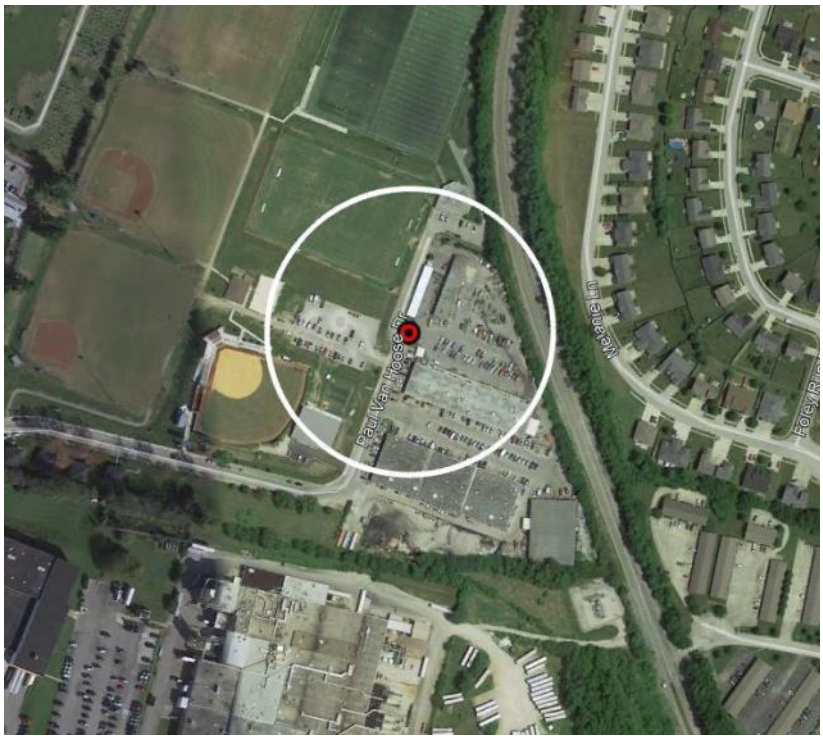
Monitors				
Monitor Type	**Inlet Height (meters)**	**Designation**	**Analysis Method**	**Frequency of Sampling**
FRM Lead	2.22	SLAMS	High volume air sampler. Analysis via ICP-MS.	24-hours every sixth day
Collocated FRM Lead	2.23	SLAMS	High volume air sampler. Analysis via ICP-MS.	24-hours every twelfth day

Quality Assurance Status:
All Quality Assurance procedures have been implemented in accordance with 40 CFR 58, Appendix A.



Area Representativeness:
This site represents source impacts on a micro scale for lead.

Micro Scale: Lead (100 m)



CSA/MSA: Pikeville, KY Micropolitan Statistical Area
401 KAR 50:020 Air Quality Control Region: Appalachian Intrastate (101)
Site Name: Pikeville Primary
AQS Site ID: 21-195-0002
Location: KYTC District Office, 109 Loraine Street, Pikeville, KY 41501
County: Pike
GPS Coordinates: 37.482575, -82.535319 (NAD 83)
Date Established: May 1, 1994
Inspection Date: October 10, 2024
Inspection By: Nall and Hicks
Site Approval Status: Site and monitors meet all design criteria for the monitoring network.

The monitoring site is a stationary equipment shelter located behind the KYTC District Office building in Pikeville, KY. The sample inlets are 96 meters from the nearest road. Upon inspection the sample lines and monitors were found to be in good condition. This site meets the requirements of 40 CFR 58, Appendices A, C, D, and E.

Monitoring Objective:
The monitoring objectives are to determine compliance with National Ambient Air Quality Standards. While not required, the site also provides pollutant levels for daily air quality index reporting.

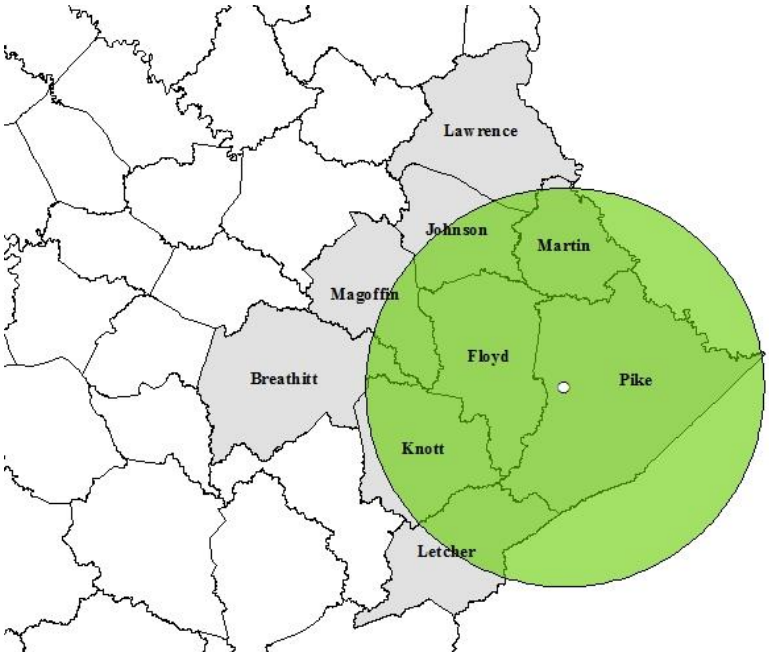
Monitors				
Monitor Type	**Inlet Height (meters)**	**Designation**	**Analysis Method**	**Frequency of Sampling**
AEM Ozone	3.66	SLAMS AQI	UV photometry	Continuously March 1 – October 31
FEM $PM_{2.5}$ Continuous	4.75	SLAMS AQI	Broadband Spectroscopy	Continuously

Quality Assurance Status:
All Quality Assurance procedures have been implemented in accordance with 40 CFR 58, Appendix A.

Area Representativeness:
The site represents population exposure on a neighborhood scale for particulates. This site also represents population exposure on an urban scale for ozone.

Neighborhood Scale: Particulates

Urban Scale: Ozone



CSA/MSA: Somerset, KY Micropolitan Statistical Area
401 KAR 50:020 Air Quality Control Region: South Central Kentucky Intrastate (105)
Site Name: Somerset
AQS Site ID: 21-199-0003
Location: Somerset Gas Company Warehouse, 305 Clifty Street, Somerset, KY 42501
County: Pulaski
GPS Coordinates: 37.097952, -84.611534 (NAD 83)
Date Established: February 14, 1992
Inspection Date: October 3, 2024
Inspection By: Nall
Site Approval Status: A waiver request for road distance approved with renewal required in 2025. See Appendix K. Site is obstructed by trees.

The monitoring site is a stationary equipment shelter located on the grounds of the Somerset Gas Company Warehouse on Clifty Street in Somerset, KY. The site is obstructed by trees and a waiver request for road proximity was included in the 2023 Network Plan and approved by EPA. The trees which are obstructing the site are about to be removed. Otherwise, the site meets the requirements of 40 CFR 58, Appendices A, C, D, E and G.

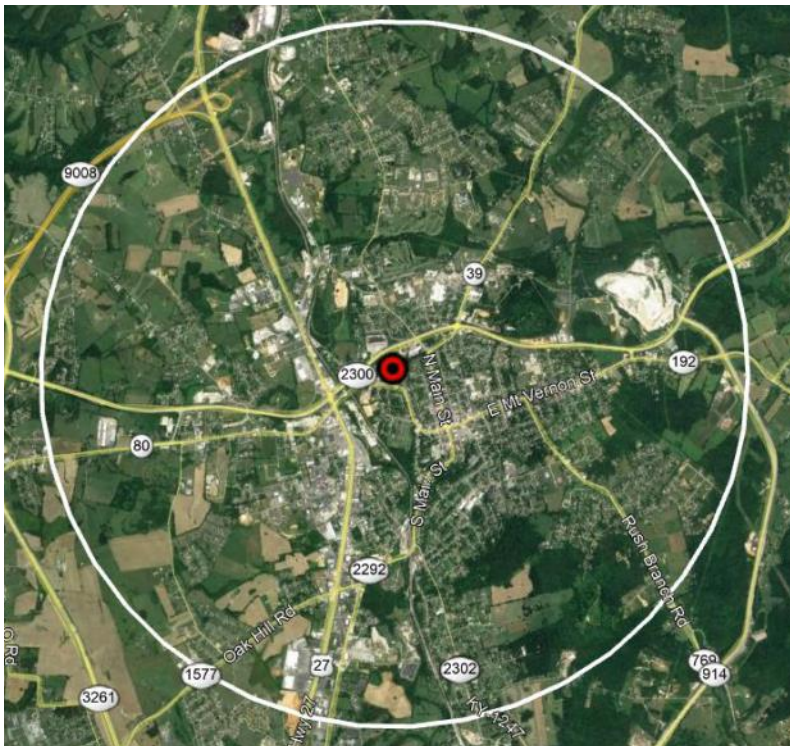
Monitoring Objective:
The monitoring objectives are to determine compliance with National Ambient Air Quality Standards.

Monitors				
Monitor Type	**Inlet Height (meters)**	**Designation**	**Analysis Method**	**Frequency of Sampling**
AEM Ozone	4.41	SLAMS AQI	UV photometry	Continuously March 1 – October 31
FEM $PM_{2.5}$ Continuous	4.75	SLAMS AQI	Broadband Spectroscopy	Continuously

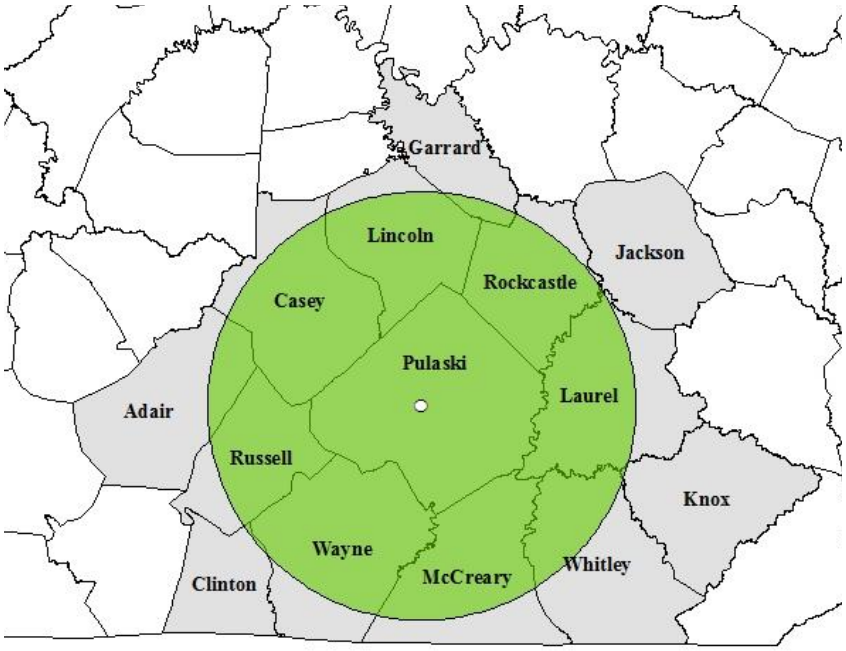
Quality Assurance Status:
All Quality Assurance procedures have been implemented in accordance with 40 CFR 58, Appendix A.

Area Representativeness:
The site represents population exposure on an urban scale for ozone. This site also represents population exposure on a neighborhood scale for particulates.

Neighborhood Scale: Particulates



Urban Scale: Ozone



CSA/MSA: Bowling Green-Glasgow-Franklin, KY CSA, Franklin, KY Micropolitan Statistical Area
401 KAR 50:020 Air Quality Control Region: South Central Kentucky Intrastate (105)
Site Name: Franklin
AQS Site ID: 21-213-0004
Location: KYTC Maintenance Facility, 573 Harding Road (KY1008), Franklin, KY 42134
County: Simpson
GPS Coordinates: 36.708607, -86.566284 (NAD 83)
Date Established: June 19, 1991
Inspection Date: December 4, 2024
Inspection By: Nall
Site Approval Status: Site and monitors meet all design criteria for the monitoring network.

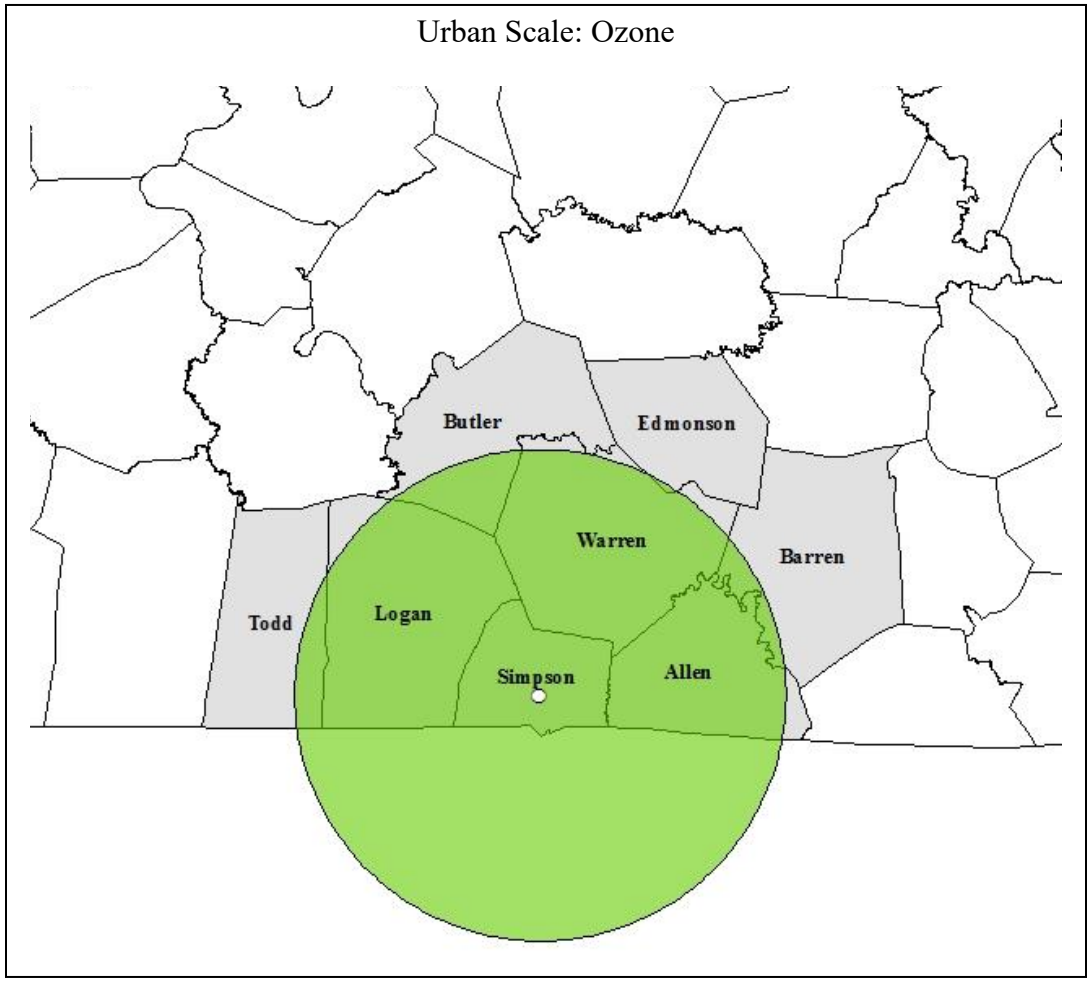
The monitoring site is a stationary equipment shelter located on the grounds of the KYTC Garage on Harding Road (KY1008) in Franklin, Kentucky. The sample inlet is 42.5 meters from the nearest road. Upon inspection, the sample line and monitor were found to be in good condition. The site meets the requirements of 40 CFR 58, Appendices A, C, D, and E.

Monitoring Objective:
The monitoring objectives are to determine compliance with National Ambient Air Quality Standards; to measure ozone levels upwind of Bowling Green; and to provide data on interstate ozone transport.

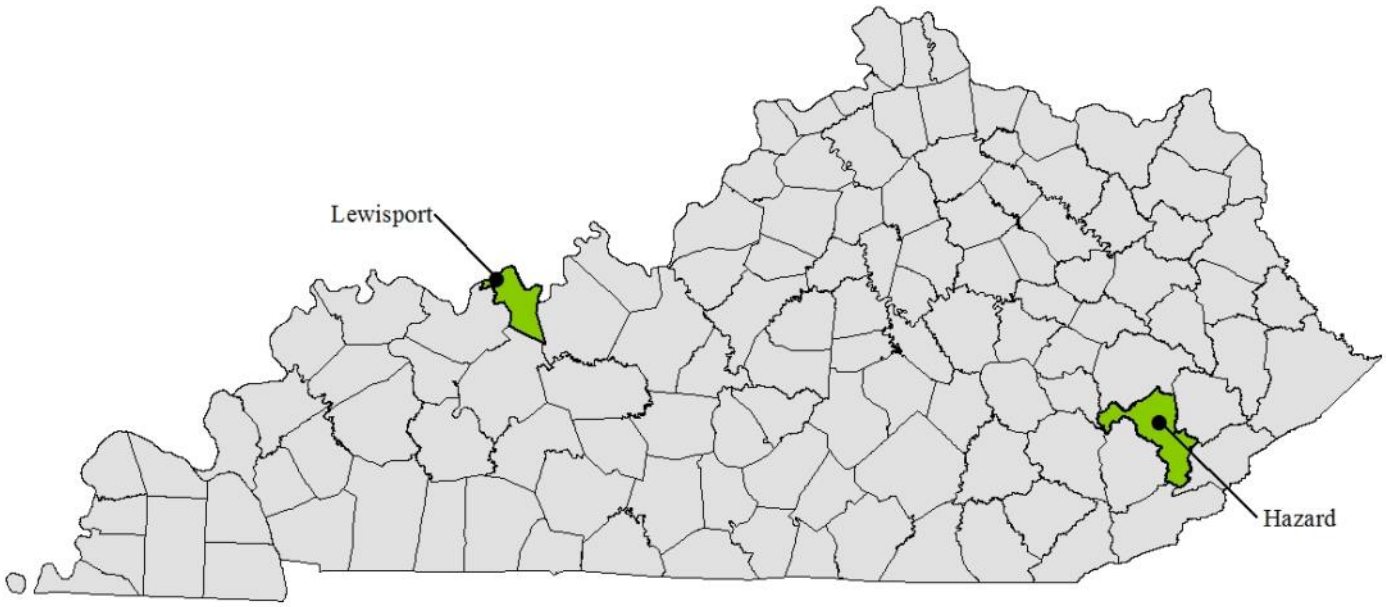
Monitors				
Monitor Type	**Inlet Height (meters)**	**Designation**	**Analysis Method**	**Frequency of Sampling**
AEM Ozone	4.47	SLAMS AQI	UV photometry	Continuously March 1 – October 31

Quality Assurance Status:
All Quality Assurance procedures have been implemented in accordance with 40 CFR 58, Appendix A.

Area Representativeness:
The site represents population exposure on an urban scale.



Not in a Metropolitan or Micropolitan Statistical Area



AQS ID / County	Site Address	PM2.5	Cont. PM2.5	PM10	Cont. PM10	SO2	NO2	NOy	CO	O3	Pb	VOC	Carbonyl	PAH	PM2.5 Spec.	Carbon Spec.	Black Carbon	RadNet	Met
21-193-0003	354 Perry Park Road		1[S,i]							1[i,e]									
Perry	Hazard																		
21-091-0012	Second & Caroline St.									1[i]									
Hancock	Lewisport																		
Totals			1							2									

Tallies are equal to the actual number of monitors present. Superscripts represent additional information about the network.

S =Continuous PM T640 i =AQI Reported

e =Emergency Episode Monitor

CSA/MSA: Not in a MSA - Rural
401 KAR 50:020 Air Quality Region: Evansville-Owensboro-Henderson Interstate (077)
Site Name: Lewisport
AQS Site ID: 21-091-0012
Location: Community Center Drive & First Street, Lewisport, KY 42351
County: Hancock
GPS Coordinates: 37.938316, -86.897194 (NAD 83)
Date Established: September 5, 1980
Inspection Date: October 22, 2024
Inspection By: Nall
Site Approval Status: Site and monitor meet all design criteria for the monitoring network.

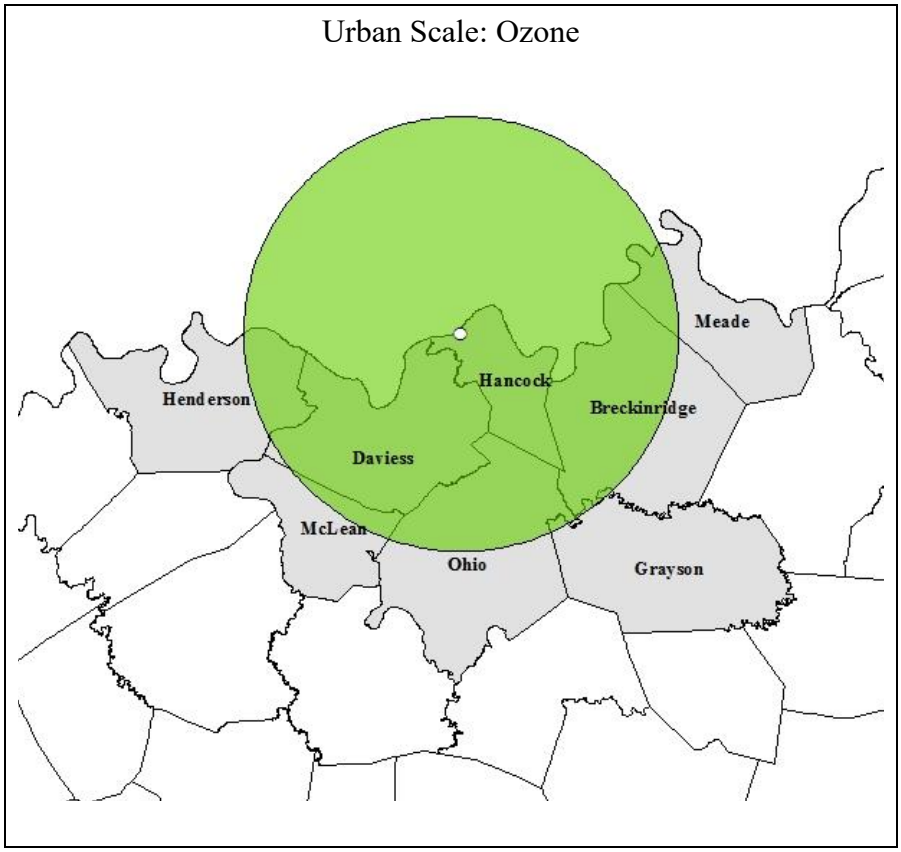
The monitoring site is a stationary equipment shelter located on the athletic fields of the former Lewisport Consolidated Elementary School in Lewisport, Kentucky. The sample inlet is 56 meters from the nearest road. Upon inspection, the sample line and monitor were found to be in good condition. The site meets the requirements of 40 CFR 58, Appendices A, C, D, and E.

Monitoring Objective:
The monitoring objectives are to determine compliance with National Ambient Air Quality Standards.

Monitors				
Monitor Type	**Inlet Height (meters)**	**Designation**	**Analysis Method**	**Frequency of Sampling**
AEM Ozone	3.7	SLAMS AQI	UV photometry	Continuously March 1 – October 31

Quality Assurance Status:
All Quality Assurance procedures have been implemented in accordance with 40 CFR 58, Appendix A.

Area Representativeness:
This site represents maximum concentrations on an urban scale.



CSA/MSA: Not in a MSA - Rural
401 KAR 50:020 Air Quality Control Region: Appalachian Intrastate (101)
Site Name: Hazard
AQS Site ID: 21-193-0003
Location: Perry County Horse Park, 354 Perry Park Road, Hazard, KY 41701
County: Perry
GPS Coordinates: 37.283247, -83.209311 (NAD 83)
Date Established: April 1, 2000
Inspection Date: October 10, 2024
Inspection By: Nall and Hicks
Site Approval Status: A waiver request approved with renewal required in 2025. See Appendix K.

The monitoring site is a stationary equipment shelter located on the grounds of Perry County Park in Hazard, Kentucky. The sample inlets are just over 10 meters from the nearest road and a waiver request was included in the 2023 Network Plan and approved by EPA. Otherwise, this site meets the requirements of 40 CFR 58, Appendices A, C, D, E, and G. Beginning in August 2022, Perry County Park became a temporary FEMA site after historic flooding that occurred in July 2022. The park is being utilized to house displaced families from flooding that occurred in February 2025.

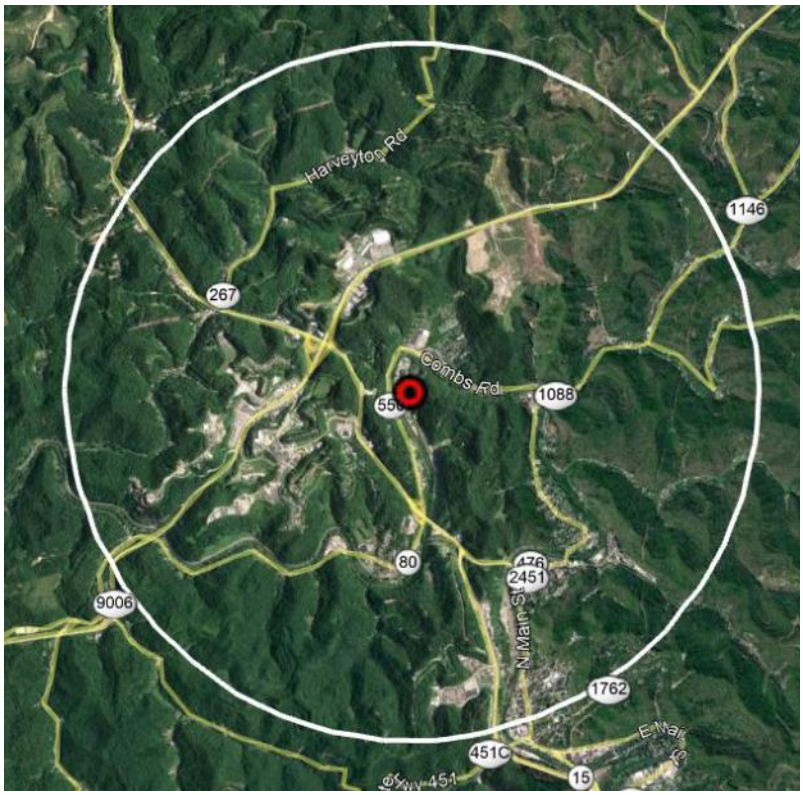
Monitoring Objective:
The monitoring objectives are to determine compliance with National Ambient Air Quality Standards and to detect elevated pollutant levels for activation of emergency control procedures for ozone.

Monitors				
Monitor Type	**Inlet Height (meters)**	**Designation**	**Analysis Method**	**Frequency of Sampling**
AEM Ozone	3.7	SLAMS AQI EPISODE	UV photometry	Continuously March 1 – October 31
FEM $PM_{2.5}$ Continuous	4.62	SLAMS AQI	Broadband Spectroscopy	Continuously

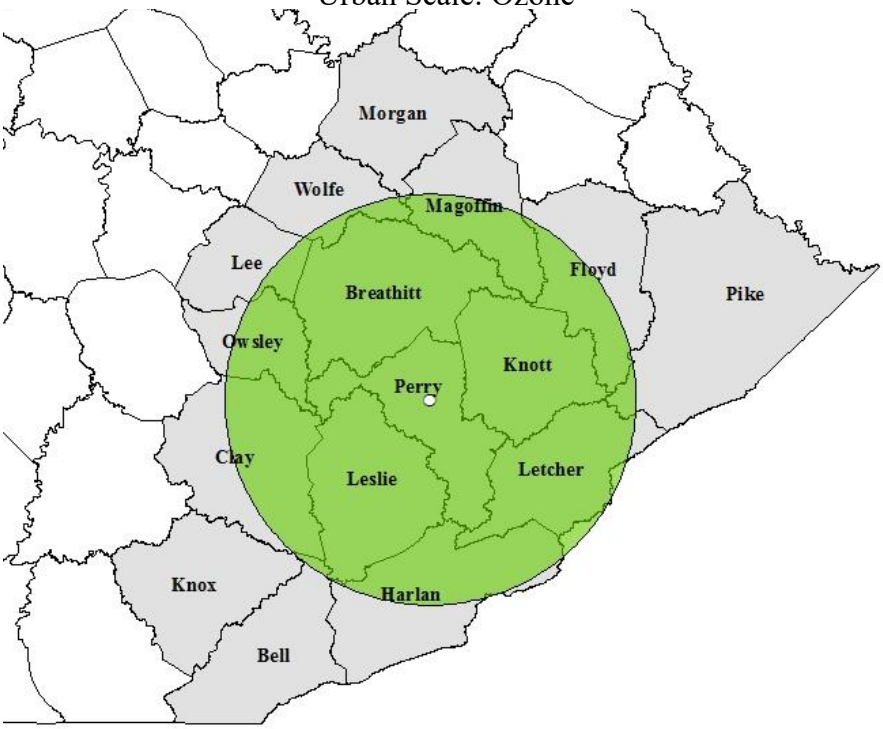
Quality Assurance Status:
All Quality Assurance procedures have been implemented in accordance with 40 CFR 58, Appendix A.

Area Representativeness:
The site represents population exposure on a neighborhood scale for particulates and urban for ozone.

Neighborhood Scale: Particulates



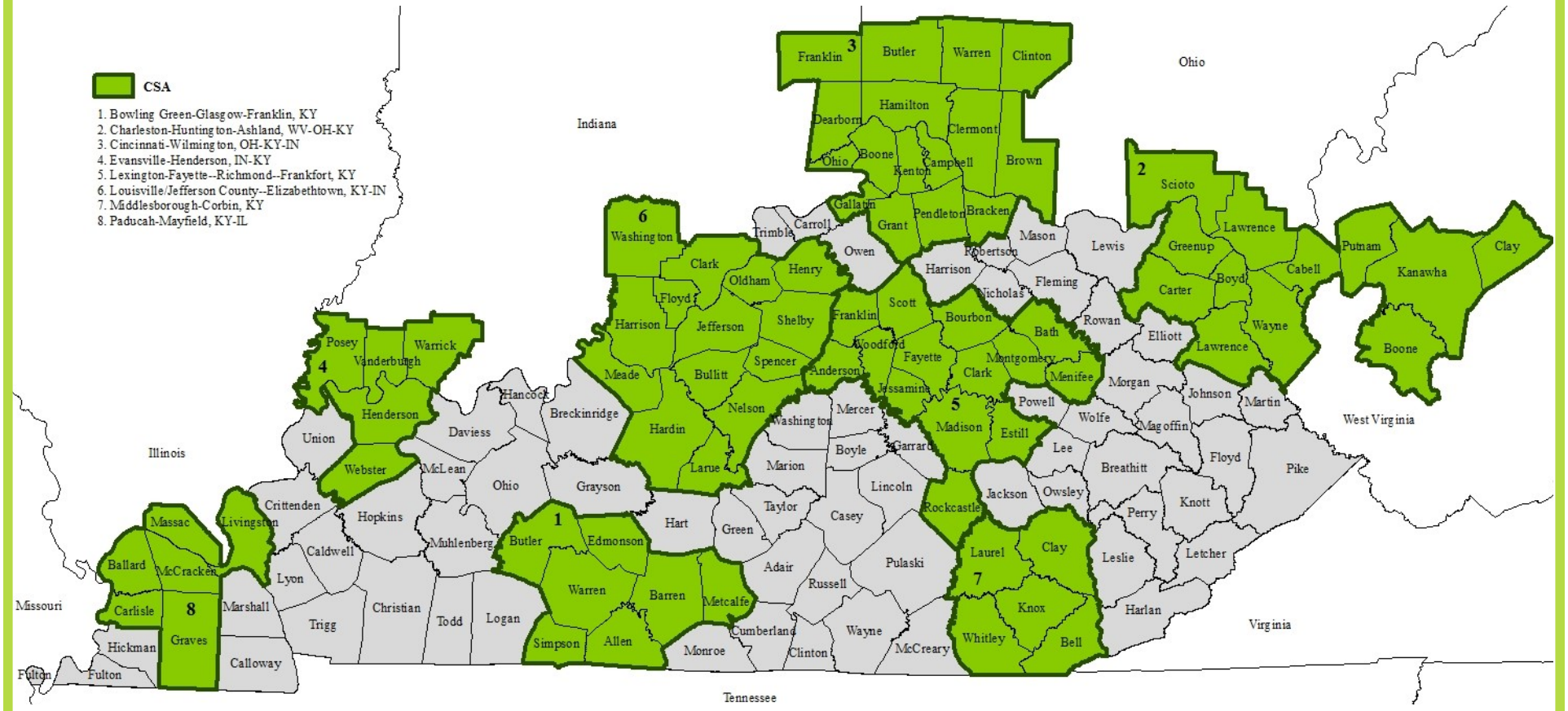
Urban Scale: Ozone



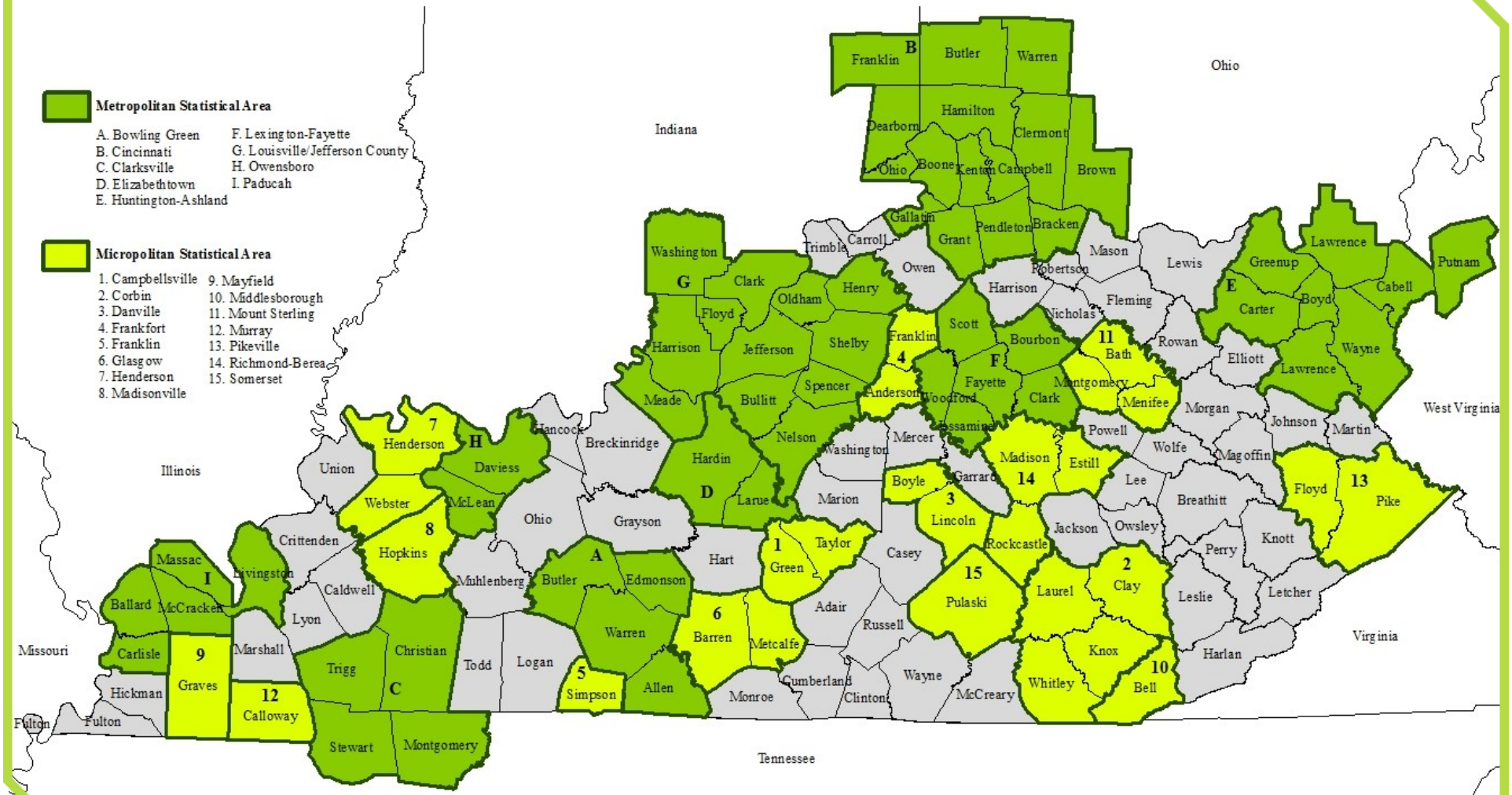
APPENDIX A

KENTUCKY CSA MAP, CBSA MAP, AND CBSA TABLES

Kentucky - Combined Statistical Areas



Kentucky - Core Based Statistical Areas



CBSAs - Metropolitan Statistical Areas							
CBSA Title	CBSA Code	County	State	State Code	County Code	County Population	CBSA Population
Bowling Green, KY	14540	Allen County	Kentucky	21	003	22,037	195,159
		Butler County	Kentucky	21	031	12,551	
		Edmonson County	Kentucky	21	061	12,635	
		Warren County	Kentucky	21	227	147,936	
Cincinnati, OH-KY-IN	17140	Dearborn County	Indiana	18	029	51,435	2,302,815
		Franklin County	Indiana	18	047	23,136	
		Ohio County	Indiana	18	115	5,996	
		Boone County	Kentucky	21	015	144,135	
		Bracken County	Kentucky	21	023	8,497	
		Campbell County	Kentucky	21	037	94,008	
		Gallatin County	Kentucky	21	077	8,805	
		Grant County	Kentucky	21	081	25,722	
		Kenton County	Kentucky	21	117	174,862	
		Pendleton County	Kentucky	21	191	14,844	
		Brown County	Ohio	39	015	44,292	
		Butler County	Ohio	39	017	399,542	
		Clermont County	Ohio	39	025	214,123	
		Hamilton County	Ohio	39	061	837,359	
		Warren County	Ohio	39	165	256,059	
Clarksville, TN-KY	17300	Christian County	Kentucky	21	047	71,006	345,955
		Trigg County	Kentucky	21	221	14,559	
		Montgomery County	Tennessee	47	125	246,025	
		Stewart County	Tennessee	47	161	14,365	
Elizabethtown, KY	21060	Hardin County	Kentucky	21	093	112,826	127,954
		Larue County	Kentucky	21	123	15,128	
Huntington-Ashland, WV-KY-OH	26580	Boyd County	Kentucky	21	019	47,777	366,920
		Carter County	Kentucky	21	043	26,098	
		Greenup County	Kentucky	21	089	35,273	
		Lawrence County	Kentucky	21	127	15,798	
		Lawrence County	Ohio	39	087	55,829	
		Cabell County	West Virginia	54	011	91,489	
		Putnam County	West Virginia	54	079	57,067	
		Wayne County	West Virginia	54	099	37,589	
Lexington-Fayette, KY	30460	Bourbon County	Kentucky	21	017	20,333	533,366
		Clark County	Kentucky	21	049	37,673	
		Fayette County	Kentucky	21	067	329,437	
		Jessamine County	Kentucky	21	113	56,495	
		Scott County	Kentucky	21	209	61,700	
		Woodford County	Kentucky	21	239	27,728	
Louisville/Jefferson County, KY-IN	31140	Clark County	Indiana	18	019	127,479	1,394,234
		Floyd County	Indiana	18	043	81,931	
		Harrison County	Indiana	18	061	39,978	
		Washington County	Indiana	18	175	28,345	
		Bullitt County	Kentucky	21	029	85,802	
		Henry County	Kentucky	21	103	16,198	
		Jefferson County	Kentucky	21	111	793,881	
		Meade County	Kentucky	21	163	30,442	
		Nelson County	Kentucky	21	179	48,706	
		Oldham County	Kentucky	21	185	70,525	
		Shelby County	Kentucky	21	211	50,124	
		Spencer County	Kentucky	21	215	20,823	
Owensboro, KY	36980	Daviess County	Kentucky	21	059	104,457	113,583
		McLean County	Kentucky	21	149	9,126	
Paducah, KY-IL	37140	Massac County	Illinois	17	127	13,627	102,395
		Ballard County	Kentucky	21	007	7,626	
		Carlisle County	Kentucky	21	039	4,777	
		Livingston County	Kentucky	21	139	8,815	
		McCracken County	Kentucky	21	145	67,550	

CBSAs - Micropolitan Statistical Areas							
CBSA Title	CBSA Code	County	State	State Code	County Code	County Population	CBSA Population
Campbellsville, KY	15820	Green County	Kentucky	21	087	11,552	38,361
		Taylor County	Kentucky	21	217	26,809	
Corbin, KY	18340	Clay County	Kentucky	21	051	19,592	149,835
		Knox County	Kentucky	21	121	29,657	
		Laurel County	Kentucky	21	125	63,353	
		Whitley County	Kentucky	21	235	37,233	
Danville, KY	19220	Boyle County	Kentucky	21	021	31,394	56,304
		Lincoln County	Kentucky	21	137	24,910	
Frankfort, KY	23180	Anderson County	Kentucky	21	005	24,883	77,325
		Franklin County	Kentucky	21	073	52,442	
Franklin, KY	23190	Simpson County	Kentucky	21	213	20,350	20,350
Glasgow, KY	23980	Barren County	Kentucky	21	009	45,609	56,167
		Metcalfe County	Kentucky	21	169	10,558	
Henderson, KY	25775	Henderson County	Kentucky	21	101	44,175	57,029
		Webster County	Kentucky	21	233	12,854	
Madisonville, KY	31580	Hopkins County	Kentucky	21	107	45,218	45,218
Mayfield, KY	32460	Graves County	Kentucky	21	083	36,821	36,821
Middlesborough, KY	33180	Bell County	Kentucky	21	013	23,051	23,051
Mount Sterling, KY	34460	Bath County	Kentucky	21	011	12,951	48,063
		Menifee County	Kentucky	21	165	6,341	
		Montgomery County	Kentucky	21	173	28,771	
Murray, KY	34660	Calloway County	Kentucky	21	035	38,975	38,975
Pikeville, KY	38210	Floyd County	Kentucky	21	071	34,532	89,962
		Pike County	Kentucky	21	195	55,430	
Richmond-Berea, KY	40080	Estill County	Kentucky	21	065	14,002	129,810
		Madison County	Kentucky	21	151	99,582	
		Rockcastle County	Kentucky	21	203	16,226	
Somerset, KY	43700	Pulaski County	Kentucky	21	199	66,842	66,842

CBSA 2024 population estimate data obtained from the US Census Bureau. Annual Resident Population Estimates and Estimated Components of Resident Population Change for Metropolitan and Micropolitan Statistical Areas and Their Geographic Components for the United States: April 1, 2020 to July 1, 2024 (CBSA-EST2024-ALLDATA). Accessed 3/20/25.

APPENDIX B

MEMORANDUM OF AGREEMENT
CINCINNATI, OH-KY-IN MSA

MEMORANDUM OF AGREEMENT
ON AIR QUALITY MONITORING FOR CRITERIA POLLUTANTS FOR THE CINCINNATI OH-KY-IN METROPOLITAN STATISTICAL AREA (MSA)

Participating Agencies:

Kentucky Department for Environmental Protection (KDEP)
Division for Air Quality (DAQ)

Hamilton County Department of Environmental Services (HCDOES)

Indiana Department of Environmental Management (IDEM)
Office of Air Quality (OAQ)

PURPOSE/OBJECTIVES/GOALS

The purpose of this Memorandum of Agreement (MOA) is to establish the Cincinnati OH-KY-IN Metropolitan Statistical Area (MSA) Criteria Pollutant Air Quality Monitoring Agreement among KDEP, IDEM, and HCDOES to collectively meet United States Environmental Protection Agency (EPA) minimum monitoring requirements for particles of an aerodynamic diameter of 10 micrometers and less (PM10), particles of an aerodynamic diameter of 2.5 micrometers and less (PM2.5), and ozone; as well as other criteria pollutant air quality monitoring deemed necessary to meet the needs of the MSA as determined reasonable by all parties. According to 40 CFR Part 58, Appendix D, the Cincinnati OH-KY-IN MSA minimum monitoring requirements (based on a population of 2,172,000) are (2) ozone monitors, (2-4) PM-10 monitors, (3) FRM PM-2.5 monitors, and (2) collocated continuous PM-2.5 monitors with the FRM PM-2.5 monitors. This MOA will formalize and reaffirm the collective agreement in order to provide adequate criteria pollutant monitoring for the Cincinnati OH-KY-IN MSA as required by 40 CFR 58 Appendix D, Section 2(e).

PM2.5 MSA monitoring network includes:

County	Federal Reference Method PM2.5	Continuous PM2.5	Speciation PM2.5	Collocated PM2.5
Campbell County, KY KDEP	1	1	0	0
Boone County, KY KDEP	0	0	0	0
Hamilton County, OH **HCDOES**	4	2	1	1
Butler County, OH **HCDOES**	2	0	0	1
Clermont County, OH **HCDOES**	1	1	0	0
Warren County, OH **HCDOES**	1	1	0	0
Franklin County, IN **IDEM**	0	0	0	0
Dearborn County, IN **IDEM**	0	0	0	0
Ohio County, IN **IDEM**	0	0	0	0

Criteria Air Pollutant MSA monitoring network includes:

County	PM10	O_3	NO_y/NO/NO2	CO	SO_2
Campbell County, KY **KDEP**	0	1	1	0	1
Boone County, KY **KDEP**	0	1	0	0	0
Hamilton County, OH **HCDOES**	3	3	1	1	1
Butler County, OH **HCDOES**	2	2	0	0	0
Clermont County, OH **HCDOES**	0	1	0	0	0
Warren County, OH **HCDOES**	0	1	0	0	0
Franklin County, IN **IDEM**	0	0	0	0	0
Dearborn County, IN **IDEM**	0	0	0	0	0
Ohio County, IN **IDEM**	0	0	0	0	0

RESPONSIBLITIES/ACTIONS

Each of the parties to this Agreement is responsible for ensuring that its obligations under the MOA are met. As conditions warrant, the affected agencies may conduct telephone conference calls, meetings, or other communications to discuss monitoring activities for the MSA. Each affected agency shall inform the other affected agencies via telephone or email of any monitoring changes occurring within its jurisdiction of the MSA at its earliest convenience, after learning of the need for the change or making the changes. Such unforeseen changes may include evictions from monitoring sites, destruction of monitoring sites due to natural disasters, or any occurrences that result in an extended (greater than one quarter) or permanent change in the monitoring network.

LIMITATIONS

- All commitments made in this MOA are subject to the availability of appropriated funds and each agency's budget priorities. Nothing in this MOA obligates KDEP, IDEM, or HCDOES to expend appropriations or to enter into any contract, assistance agreement, interagency agreement or other financial obligation.

- This MOA is neither a fiscal nor a funds obligation document. Any endeavor involving reimbursement or contribution of funds between parties to this agreement will be handled in accordance with applicable laws, regulations, and procedures, and will be subject to separate agreements that will be affected in writing by representatives of the parties.

- This MOA does not create any right or benefit enforceable by law or equity against KDEP, IDEM, or HCDOES, their officers or employees, or any other person. This MOA does not apply to any entity outside KDEP, IDEM, or HCDOES.

- No proprietary information or intellectual property is anticipated to arise out of this MOA.

TERMINATION

This Memorandum of Agreement may be revised upon the mutual consent of KDEP, IDEM, and HCDOES. Each party reserves the right to terminate this MOA. A thirty (30) day written notice must be given prior to the date of termination.

APPROVALS

We agree with the provisions outlined in this Memorandum of Agreement and commit our agencies to implement them in a spirit of cooperation and mutual support.

Kentucky Department for Environmental Protection
Division for Air Quality

BY: John Lyons John S. Lyons

TITLE: Director, Division for Air Quality

DATE: 5/13/10

Hamilton County Department of Environmental Services

BY: Cory Chadwick Cory R. Chadwick

TITLE: Director

DATE: 5/13/10

Indiana Department of Environmental Management
Office of Air Quality

BY: Keith Baugues Keith Baugues

TITLE: Assistant Commissioner, Office of Air Quality

DATE: 5/14/10

APPENDIX C

MEMORANDUM OF AGREEMENT
EVANSVILLE, IN-KY MSA

MEMORANDUM OF AGREEMENT
ON AIR QUALITY MONITORING FOR CRITERIA POLLUTANTS FOR
THE EVANSVILLE, IN-HENDERSON, KY
METROPOLITAN STATISTICAL AREA (MSA)

Participating Agencies:

Kentucky Department for Environmental Protection (KDEP)
Division for Air Quality (DAQ)

Indiana Department of Environmental Management (IDEM)
Office of Air Quality (OAQ)

PURPOSE/OBJECTIVES/GOALS

The purpose of this Memorandum of Agreement (MOA) is to establish the Evansville, IN-Henderson, KY Metropolitan Statistical Area (MSA) Criteria Pollutant Air Quality Monitoring Agreement among KDEP and IDEM to collectively meet United States Environmental Protection Agency (EPA) minimum monitoring requirements for particles of an aerodynamic diameter of 10 micrometers and less (PM 10), particles of an aerodynamic diameter of 2.5 micrometers and less (PM2.5), and ozone; as well as other criteria pollutant air quality monitoring deemed necessary to meet the needs of the MSA as determined reasonable by all parties. According to 40 CFR Part 58, Appendix D, the Evansville, IN-Henderson, KY MSA minimum monitoring requirements (based on a population of 350,000) are (2) ozone monitors, (0-1) PM-10 monitors, (1) FRM PM-2.5 monitor, and (1) collocated continuous PM-2.5 monitor with the FRM pm-2.5 monitor. This MOA will formalize and reaffirm the collective agreement in order to provide adequate criteria pollutant monitoring for the Evansville, IN-Henderson, KY MSA as required by 40 CFR *58* Appendix D, Section 2, (e).

PM *2.5* MSA monitoring network includes:

County	Federal Reference Method PM2.5	Continuous PM2.5	Speciation PM2.5	Collocated PM2.5
Henderson County, KY **KDEP**	1	1	0	0
Vanderburgh County, IN **IDEM**	3	1	1	1

Criteria Air Pollutant MSA monitoring network includes:

County	PM10	O_3	NO_x/NO/NO_2	CO	SO_2
Henderson County, KY **KDEP**	1	1	0	0	1
Vanderburgh County, IN **IDEM**	1	2	1	1	1

RESPONSIBLITIES/ACTIONS

Each of the parties to this Agreement is responsible for ensuring that its obligations under the MOA are met. As conditions warrant, the affected agencies may conduct telephone conference calls, meetings, or other communications to discuss monitoring activities for the MSA. Each affected agency shall inform the other affected agencies via telephone or email of any monitoring changes occurring within its jurisdiction of the MSA at its earliest convenience, after learning of the need for the change or making the changes. Such unforeseen changes may include evictions from monitoring sites, destruction of monitoring sites due to natural disasters, or any occurrences that result in an extended (greater than one quarter) or permanent change in the monitoring network.

LIMITATIONS

- All commitments made in this MOA are subject to the availability of appropriated funds and each agency's budget priorities. Nothing in this MOA obligates KDEP or IODEM to expend appropriations or to enter into any contract, assistance agreement, interagency agreement or other financial obligation.

- This MOA is neither a fiscal nor a funds obligation document. Any endeavor involving reimbursement or contribution of funds between parties to this agreement will be handled in accordance with applicable laws, regulations, and procedures, and will be subject to separate agreements that will be affected in writing by representatives of the parties.

- This MOA does not create any right or benefit enforceable by law or equity against KDEP or IDEM, their officers or employees, or any other person. This MOA does not apply to any entity outside KDEP or IDEM.

- No proprietary information or intellectual property is anticipated to arise out of this MOA.

TERMINATION

This Memorandum of Agreement may be revised upon the mutual consent of KDEP and IDEM. Each party reserves the right to terminate this MOA. A thirty (30) day written notice must be given prior to the date of termination.

APPROVALS

We agree with the provisions outlined in this Memorandum of Agreement and commit our agencies to implement them in a spirit of cooperation and mutual support.

Kentucky Department for Environmental Protection
Division for Air Quality

BY: John. S. Lyons John S. Lyons

TITLE: Director, Division for Air Quality

DATE: 5/14/10

Indiana Department of Environmental Management
Office of Air Quality

BY: Keith Baugues Keith Baugues

TITLE: Assistant Commissioner, Office of Air Quality

DATE: 5/24/10

APPENDIX D

MEMORANDA OF AGREEMENT
CLARKSVILLE, TN-KY MSA

Department of Environment & Conservation

April 7, 2025

Mr. Michael Kennedy, PE
Director
Kentucky Division for Air Quality
Kentucky Department for Environmental Protection
300 Sower Boulevard
2nd Floor
Frankfort, KY 40601

Dear Mr. Kennedy:

The United States Environmental Protection Agency's (EPA) monitoring regulations found in 40 CFR Part 58, Appendix D states in part "The EPA recognizes that there may be situations where the EPA Regional Administrator and the affected State or local agencies may need to augment or divide the overall MSA/CSA monitoring responsibilities and requirements among these various agencies to achieve an effective network design. Full monitoring requirements apply separately to each affected State or local agency without an agreement between the affected agencies and the EPA Regional Administrator." This revision of the CFR also describes the minimum monitoring requirements for the NAAQS pollutants. Tennessee and Kentucky share the Clarksville, TN-KY MSA, which is comprised of Trigg and Christian counties in Kentucky, and Montgomery and Stewart counties in Tennessee.

CBSA Code	Geographic Area	Legal/Statistical Area Description	2023 Pop Estimate	2020 Census
17300	Clarksville, TN-KY	Metropolitan Statistical Area	340495	320518

The Tennessee Division of Air Pollution Control (TDAPC) currently operates one (1) PM2.5 FEM continuous monitor at the Clarksville site (47-125-2001) in Montgomery County, TN. This site provides sufficient characterization of the particulate air quality in the entire Clarksville, TN-KY MSA and complies with the population and concentration-based monitoring requirements identified in the regulations found at 40 CFR 58, Appendix D.

The Kentucky Division for Air Quality (KDAQ) currently operates one (1) continuous PM2.5 FEM monitor and one (1) seasonal ozone monitor at the Hopkinsville site (21-047-0006) in Christian County, KY. This site is being relocated within the MSA with a proposed start date of July 1, 2025. The new location at Pennyrile Forest (21-047-0007) in Christian County, KY, will continue to operate one (1) continuous PM2.5 FEM monitor and one (1) seasonal ozone monitor. This site characterizes the air quality in the entire Clarksville, TN-KY MSA and complies with the requirements for both population concentration-based monitoring identified in 40 CFR Part 58, Appendix D.

Division of Air Pollution Control
Davy Crockett Tower • 7th Floor
500 James Robertson Parkway • Nashville, TN 37243
Tel: 615-532-0554
Air.Pollution.Control@tn.gov

Department of Environment & Conservation

The Tennessee Division of Air Pollution Control invites the Kentucky Division for Air Quality to participate in Tennessee's annual ambient air monitoring network review. Tennessee commits to notifying Kentucky in advance of any proposed monitor relocations or shutdowns in the Clarksville, TN-KY MSA. We respectfully request that Kentucky provide similar advanced notice to Tennessee regarding any proposed changes to monitoring sites within the Clarksville, TN-KY MSA. If you have technical questions, contact Bradley King at 615-417-1254 or Bradley.King@tn.gov. I may be contacted at 615-426-9250 or Michelle.B.Walker@tn.gov.

Sincerely,

Michelle W. Owenby

Michelle Walker Owenby
Director
Division of Air Pollution Control
Tennessee Department of Environment and Conservation

Division of Air Pollution Control
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May 5, 2025

Ms. Michelle Walker Owenby
Director
Division of Air Pollution Control
Tennessee Department of Environment and Conservation
Davy Crockett Tower, 7th Floor
500 James Robertson Parkway
Nashville, TN 37243

Dear Ms. Owenby:

In a letter from your office dated April 7, 2025, the Tennessee Division of Air Pollution Control (TDAPC) operates a continuous $PM_{2.5}$ monitor in order to meet the minimum network design requirements stated in 40 CFR 58, Appendix D for the Clarksville, TN-KY metropolitan statistical area (MSA). The Kentucky Division for Air Quality (KDAQ) appreciates TDAPC's cooperation and appreciates the invitation to participate in TDAPC's annual air monitoring review.

KDAQ currently operates one (1) continuous $PM_{2.5}$ FEM monitor and one (1) continuous ozone monitor at the Hopkinsville site (21-047-0006) in Christian County, KY. This site is being relocated within Christian County with a proposed start date of July 1, 2025. The new location at Pennyrile Forest (21-047-0007) will continue to operate one (1) continuous $PM_{2.5}$ FEM monitor and one (1) continuous ozone monitor.

In accordance with Table D-2 and D-5 of 40 CFR 58, Appendix D, one (1) ozone monitor and one (1) $PM_{2.5}$ monitor is required to be operated in the Clarksville, TN-KY MSA, based upon currently available population estimates from the US Census Bureau, as well as 2022-2024 ozone and $PM_{2.5}$ design values.

Geographic Area	Code	2024 USCB Population Est.	2022-2024 3-Year O_3 DV	2022-2024 3-Year $PM_{2.5}$ DV
Christian County, KY	21-047	71,006	0.065	7.9
Trigg County, KY	21-221	14,559	0.059 (CASTNET)*	-
Montgomery County, TN	47-125	246,025	-	6.7
Stewart County, TN	47-161	14,365	-	-
Clarksville, TN-KY MSA	**17300**	**345,955**	**0.065**	**7.9**

**Does not meet data completeness requirements*

To satisfy regulatory requirements, KDAQ operates one (1) ozone monitor and one (1) $PM_{2.5}$ monitor at the Pennyrile site. KDAQ appreciates and accepts TDAPC's offer to participate in its annual ambient air monitoring network review. KDAQ will provide advanced notice of any changes to the two (2) Kentucky monitors included in the Clarksville, TN-KY MSA. If you have further questions or concerns, please contact Jenna Nall at jenna.nall@ky.gov.

Sincerely,

Michael Kennedy

Michael Kennedy,
Director

MK/jln

Electronic cc:
-Bradly King, TDAPC
-Wayne Bray, KDAQ

APPENDIX E

LMAPCD
AMBIENT AIR MONITORING
NETWORK 2025

AIR POLLUTION CONTROL DISTRICT

Louisville Metro Air Pollution Control District's Proposed Changes to the Ambient Air Quality Monitoring Network

May 2025

Table of Contents

LMAPCD Proposed Network Changes – Overview

The Louisville Metro Air Pollution Control District (LMAPCD) is not proposing any significant changes to the criteria pollutant ambient monitoring network during the 2025 Network Planning period (July 2025 through June 2026). The air monitoring network used to determine compliance with the National Ambient Air Quality Standards (NAAQS) is expected to remain stable for the next 12-18 months. However, some changes / modifications may occur for instrumentation that is used for non-NAAQS monitoring. This document serves to provide general information about LMAPCD's ambient air monitoring network, updates on proposed changes mentioned in prior network plans, and anticipated changes for the next 12-18 months. Additional details and clarifications on various aspects of the monitoring network are presented below.

Particulate Matter Network Update & Intended Use of $PM_{2.5}$ Monitors

As discussed in prior network plans, LMAPCD continues to use *Teledyne API T640 or T640x $PM_{2.5}$ FEM monitors as the primary method for determining compliance with the $PM_{2.5}$ NAAQS.* LMAPCD also operates two filter-based samplers, but these samplers serve as collocated monitors to assess and evaluate the comparability between continuous methods and filter-based methods. Table 1 serves to clarify the intended use of LMAPCD's $PM_{2.5}$ data. It should be noted that LMAPCD applied and enabled the 'Network Data Alignment' option for the T640 and T640x monitors in November and December of 2023. During the Spring and Summer of 2024, EPA performed recalculations of historic T640/T640x $PM_{2.5}$ data to align with EPA's Network Data Alignment project. In doing so, EPA created new 'monitors' in AQS to house the recalculated data. These new AQS monitors utilized a parameter occurrence code (POC) of 23 (versus POC 3 that has traditionally been used). After the EPA $PM_{2.5}$ data recalculations were completed, some $PM_{2.5}$ monitor metadata cleanup / updates were needed in AQS. These AQS metadata updates were performed by APCD staff throughout 2024 to ensure that $PM_{2.5}$ data and associated QA/QC metrics were being reported and summarized properly. So while $PM_{2.5}$ calculations and statistics utilized POC 23 data for a period of time, POC 3 parameters have resumed as the official $PM_{2.5}$ monitors in AQS.

$PM_{2.5}$ Monitors Operated by LMAPCD – Current								
Site Name	***AQS ID***	***Parameter Code***	***POC***	***Monitor Type***	***Method***	***Primary Monitor?***	***Compare to NAAQS?***	***Eligible for AQI?***
Watson Lane	21-111-0051	88101	3	SLAMS	API T640	Yes	Yes	Yes
Cannons Lane	21-111-0067	88101	3	SLAMS	API T640x	Yes	Yes	Yes
Cannons Lane	21-111-0067	88101	1	Colloc	Thermo 2025i	No	Yes	NA
Carrithers Middle School	21-111-0080	88101	3	SLAMS	API T640	Yes	Yes	Yes
Durrett Lane	21-111-0075	88101	3	SLAMS	API T640	Yes	Yes	Yes
Durrett Lane	21-111-0075	88101	1	Colloc	Thermo 2025i	No	Yes	NA
Algonquin Parkway	21-111-1041	88101	3	SLAMS	API T640x	Yes	Yes	Yes

Table 1 - List of LMAPCD $PM_{2.5}$ monitors that are currently in place and will remain in place for the foreseeable future.

Photochemical Assessment Monitoring Station (PAMS)

Based on updated monitoring regulations in 40 CFR Part 58, Appendix D, state and local air monitoring agencies were to begin PAMS monitoring at their NCore location by June 1, 2021. Due to delays in the procurement of equipment, several of the PAMS required parameters were not ready to be collected at the start of the 2021 PAMS season. While most PAMS instrumentation was physically in place by July 1, 2021, the procurement delays did not provide sufficient time to perform adequate acceptance testing to ensure that quality data could be obtained for the 2021 PAMS season. This was particularly true for mixing height, carbonyls, and continuous VOC monitoring. As such, APCD did not find it appropriate to report the 2021 PAMS data to EPA's AQS database. While procurement, staffing, and technical challenges remain for APCD's PAMS program, APCD intends to report available and valid PAMS data beginning with the 2022 PAMS season. Recently, APCD staff have made progress on reporting of previously unavailable PAMS data. Carbonyls data have been reported to AQS for the 2022 and 2023 PAMS season, with 2024 PAMS season data soon to be reported. Hourly VOC data for 2022 and 2023 PAMS seasons are expected to be reported to AQS by May 31, 2025, while 2024 VOC data need additional review before being reported. Ceilometer data for 2021, 2022, 2023, and part of 2024 were successfully reported to the UCN team via the manual file upload process. Table 2 provides a listing of all required PAMS parameters and their status as of May 2025. LMAPCD continues to work as diligently as possible to operate the PAMS instrumentation and evaluate the data so that meaningful, valid data can be collected and reported to EPA's AQS database.

Status of PAMS Parameters at APCD's Cannons Lane NCore Site			
Required PAMS Measurement	*Instrumentation*	*Instrument Status*	*Data Reporting Status*
Hourly VOCs	CAS / Chromatotec Auto GC	Operational	Delayed
Carbonyls	ATEC 8000-2 Carbonyl Sampler	Operational	Delayed
Hourly Ozone	Teledyne API T400 or N400	Operational	Current
True NO2	Teledyne API T500U	Operational	Current
NOy	Teledyne API T200U NOy	Operational	Current
Ambient Temp	RM Young 41382 Temp/RH Probe	Operational	Current
Wind	RM Young 85000 Ultrasonic	Operational	Current
Ambient Pressure	RM Young 61302V	Operational	Current
Precipitation	Met One 370 Tipping Bucket	Operational	Current
Hourly Mixing Height	Vaisala Ceilometer CL51	Operational	Intermittent via Manual Upload Method
Solar Radiation	Eppley PS Pyranometer	Operational	Current
UV Radiation	Eppley TUVR Radiometer	Operational	Current

Table 2 - List of PAMS parameters required by 40 CFR Part 58 Appendix D and the status of those parameters at APCD's Cannons Lane NCore site.

Air Toxics Monitoring

LMAPCD also performs Air Toxics monitoring at the Algonquin Parkway site using similar technology to that of the Consolidated Analytical System's (CAS) Chromatotec Auto GC that is used for PAMS monitoring of hourly VOCs. The Auto GC at Algonquin Parkway underwent numerous upgrades in previous years and significant effort has been put forth to improve the system and sync it with

LMAPCD's central data collection system and database. Routine collection and validation of a subset of Volatile Organic Compounds (VOCs) began in July 2020. The Auto GC system technology continues to experience some limitations in assessing all Toxics compounds of interest. Furthermore, LMAPCD continues to experience some data management challenges due to the combined volume of data from the Algonquin Parkway Auto GC and Cannons Lane Auto GC. This data management challenge along with the significant time and resources needed to produce data of sufficient quality have resulted in some gaps and delays in the reporting of these data.

Black Carbon Monitoring at Durrett Lane Near Road Site

The Magee Scientific AE33 Aethalometer was installed at the Durrett Lane Near Road site in June 2022 and the instrument underwent initial evaluation and performance testing. Development of QA/QC procedures and necessary data post processing procedures occurred throughout 2023 and a preliminary determination of valid data commenced in September 2023. While SOPs are still in development, along with refinements to the QA/QC process and data post processing techniques, the confidence in the quality of the data continues to increase. When it has been determined that the data collection and data validation process is providing quality data, the data will be made more widely available.

Meteorological Measurements, Low-Cost Sensors, and Special Projects

LMAPCD continues to explore and evaluate air quality monitoring needs of the Louisville community beyond the regulatorily required monitoring. While LMAPCD believes additional monitoring may be necessary at times to better characterize air quality throughout Louisville, projects such as these are dependent on available funding, staffing, and necessary monitoring resources. Below is a summary/update of some air monitoring projects that LMAPCD has pursued in the past or plans to pursue in the near future.

Hydrogen Sulfide Monitoring at Algonquin Parkway Site

LMAPCD installed a continuous Hydrogen Sulfide (H_2S) monitor at the Algonquin Parkway site in June 2024 to characterize H_2S concentrations in the vicinity of the Morris Forman Water Quality Treatment Center in West Louisville. LMAPCD utilizes the Teledyne API T101 H_2S analyzer which provides hourly averaged H_2S concentrations. This H_2S monitor is considered a special purpose monitor (SPM) and has been helpful in relating odors to quantifiable H_2S concentrations.

Rubbertown Air Toxics & Health Action Project

As part of the EPA EJG2G Grant Program and in coordination with other partners, LMAPCD planned to collect additional air quality samples in the vicinity of Rubbertown to further characterize air quality conditions in this area beginning in early 2025 for a 12-month study. Pollutants targeted to be measured included VOCs, formaldehyde, and speciated metal components from particulate samples. In March 2025, EPA terminated the funding, a decision which LMAPCD is disputing per 2 CFR 1500.15.

Low Cost Sensor Projects & Meteorological Measurements

LMPACD was granted a Sensor Collocation Shelter by EPA Region 4 that can be used to collocate low-cost sensors with federally approved methods at the Cannons Lane NCore site. This collocation shelter was installed in May 2022 and has remained in place. LMAPCD has also installed some low-cost sensors

at the Durrett Lane Near Road site for general evaluation purposes. The Durrett Lane and Cannons Lane sites allow for collocation of low-cost sensors with federally approved methods to help assess the accuracy of low-cost sensors. LMAPCD will continue to pursue or support low-cost sensor opportunities, as resources and funding allow, to help respond to community needs or to screen areas for future air monitoring network needs or source specific hot spots.

As time and resources allow, LMAPCD continues to evaluate the accuracy and robustness of meteorological measurements that are used to support air quality measurements at LMAPCD's sites. Some of the meteorological instrumentation is aging and may require replacement or repair. The LMAPCD air monitoring team also continues to evaluate quality control / quality assurance procedures associated with meteorological measurements.

Since many of these meteorological instruments and low-cost sensors are not required State and Local Air Monitoring Station (SLAMS) monitors for NAAQS compliance, these networks will be evaluated, upgraded, and improved upon as time and resources allow.

Conclusion

Much of the information presented in this document is intended to provide clarifications on minor network modifications and updates on previously proposed changes. Table 3 provides a summary of the number of ambient air quality monitoring sites in operation for each pollutant group within the Louisville MSA. As indicated in Table 3, the Louisville MSA continues to meet/exceed the EPA minimum monitoring requirements through the collective efforts of the Indiana Department of Environmental Management (IDEM), KDAQ, and the LMAPCD. It should also be noted that the operation of ambient air quality monitors by the LMAPCD alone meets the EPA minimum monitoring requirements for the Louisville MSA.

Louisville / Jefferson County MSA Monitoring Requirements												
	O_3	$PM_{2.5}$	PM_{10}	PM_c	PM_{BC}	CSN	SO_2	NO_2	CO	Toxics	PAMS	H_2S
# Sites Required by CFR	2	3	2-4	1	0	0	1	2	2	0	1	0
# Current Sites	8(4)	7(5)	3(2)	1(1)	2(1)	2(1)	4(3)	2(2)	2(2)	2(1)	1(1)	1(1)
# Sites After proposed Changes	8(4)	7(5)	3(2)	1(1)	2(1)	2(1)	4(3)	2(2)	2(2)	2(1)	1(1)	1(1)

Table 3 - Summary of monitoring requirements in Louisville / Jefferson County MSA compared to number of monitors / sites before and after proposed network changes. Numbers in parenthesis represents number of sites that APCD operates (versus total number in MSA).

APPENDIX F

KDAQ INTENDED USE OF CONTINUOUS $PM_{2.5}$ FEMS

Appendix F
KDAQ Intended Use of Continuous $PM_{2.5}$ FEMs

Historically, continuous $PM_{2.5}$ monitors that are designated as Federal Equivalent Methods (FEMs) have been excluded from comparisons to the NAAQS, as long as these monitors were specified as special-purpose monitors (SPMs). Data from these monitors were used for reporting of the AQI. Monitors could remain designated as SPMs for a period of two years of operation at each site. However, after that two-year period, the data were eligible for comparison to the NAAQS, regardless of monitor type designation.

In December 2012, a new PM NAAQS and set of monitoring rules were finalized. These new monitoring rules amended the previous requirement to compare all data from FEMs collected after a period of two-years to the NAAQS. Instead, agencies could operate a continuous $PM_{2.5}$ FEM for longer than two years and could elect to exclude the data from NAAQS-comparisons, provided that the monitor did not meet certain performance specifications. Data from monitors established for less than two years and designated as SPM remain ineligible for attainment decisions.

Specifically, the final rule allows certain continuous $PM_{2.5}$ FEM data to be excluded if:

- the monitor does not meet performance criteria when compared to the data collected from collocated Federal Reference Methods (FRMs);
- the monitoring agency requests exclusion of data; and,
- the EPA Regional Office approves exclusion of the data.

Regardless of whether an exclusion is sought, each agency must address the use of all continuous $PM_{2.5}$ FEMs in the network. Each monitor must be properly referenced by a set of parameter codes, primary monitor designations, and monitor types.

KDAQ will operate 15 FEM $PM_{2.5}$ continuous T640 monitors in the field; of which, all 15 are eligible for NAAQS comparisons. The following sites have T640 monitors:

- Freeman Lake
- Northern Kentucky University
- Ashland Primary
- Grayson Lake
- Meadow Lands
- Paducah Transit
- Pikeville
- Smiths Grove (Primary and Collocated)
- Lexington Primary
- Nicholasville
- Hazard
- Pennyrile Forest
- Somerset
- Middlesboro

Appendix F
KDAQ Intended Use of Continuous $PM_{2.5}$ FEMs

KDAQ will operate a total of 15 FEM $PM_{2.5}$ continuous T640 monitors in the field during the 2025-2026 monitoring year, all of which, will be usable for NAAQS determinations. All NAAQS-eligible monitors are designated as SLAMS. The tables that follow provide a summary of KDAQ's use of the T640 continuous $PM_{2.5}$ FEMs, collocation scenarios, and dates of operation.

Northern Kentucky University (21-037-3002)

Scenario: Continuous $PM_{2.5}$ FEM is eligible for NAAQS comparisons and is collocated with a filter-based FRM.

FEM Parameter	FEM Pollution Occurrence Code (POC)	FEM Monitor Type	Primary Monitor	Collocated Monitor	FEM used for substitutions of missing primary data?	FEM used for NAAQS compari-sons?	FEM eligible for AQI?	Date FEM Installed at Site	Date FEM Eligible for NAAQS Comparisons
PM2.5 Local Conditions (88101)	POC 3	SLAMS	Filter-Based FRM (POC 1)	Continuous FEM (POC 3)	Yes	Yes	Yes	2/12/2018	2/13/2020

Freeman Lake (21-093-0007)

Scenario: Continuous $PM_{2.5}$ FEM is eligible for NAAQS comparisons and is collocated with a filter-based FRM.

FEM Parameter	FEM Pollution Occurrence Code (POC)	FEM Monitor Type	Primary Monitor	Collocated Monitor	FEM used for substitutions of missing primary data?	FEM used for NAAQS compari-sons?	FEM eligible for AQI?	Date FEM Installed at Site	Date FEM Eligible for NAAQS Comparisons
PM2.5 Local Conditions (88101)	POC 3	SLAMS	Continuous FEM (POC 3)	Filter-Based FRM (POC 2)	Yes	Yes	Yes	3/3/2025	3/3/2025

Smiths Grove and Smiths Grove Collocated (21-227-0009)

Scenario: Continuous $PM_{2.5}$ FEMs are collocated and are eligible for NAAQS comparisons.

FEM Parameter	FEM Pollution Occurrence Code (POC)	FEM Monitor Type	Primary Monitor	Collocated Monitor	FEM used for substitutions of missing primary data?	FEM used for NAAQS compari-sons?	FEM eligible for AQI?	Date FEM Installed at Site	Date FEM Eligible for NAAQS Comparisons
PM2.5 Local Conditions (88101)	POC 3 (Primary) POC 4 (Collocated)	SLAMS	Continuous FEM (POC 3)	Continuous FEM (POC 4)	Yes	Yes	Yes	Primary: 2/17/2019 Collocated: 10/29/2019	Primary: 1/1/2021 Collocated: 1/1/2021

Appendix F
KDAQ Intended Use of Continuous $PM_{2.5}$ FEMs

Multiple Sites Scenario: Continuous $PM_{2.5}$ FEMs will be eligible for NAAQS comparisons during monitoring year. No other $PM_{2.5}$ monitors located on site.									
FEM Parameter	**FEM Pollution Occurrence Code (POC)**	**FEM Monitor Type**	**Primary Monitor**	**Collocated Monitor**	**FEM used for substitutions of missing primary data?**	**FEM used for NAAQS compari-sons?**	**FEM eligible for AQI?**	**Date FEM Installed at Site**	**Date FEM Eligible for NAAQS Comparisons**
$PM_{2.5}$ Local Conditions (88101)	POC 3	SLAMS	Continuous FEM (POC 3)	n/a	n/a	Yes	Yes	Middlesboro (21-013-0002)	
								1/1/2021	1/1/2021
								Ashland Primary (21-019-0017)	
								7/26/2017	7/27/2019
								Grayson Lake (21-043-0500)	
								1/1/2022	1/1/2022
								Pennyrile Forest (21-047-0007)	
								TBD	TBD
								Meadow Lands (21-059-0015)	
								11/21/2024	11/21/2024
								Lexington Primary (21-067-0012)	
								12/4/2018	1/1/2021
								Nicholasville (21-113-0001)	
								1/1/2025	1/1/2025
								Paducah Transit (21-145-1027)	
								1/10/2023	1/10/2023
								Hazard (21-193-0003)	
								2/28/2019	1/1/2021
								Pikeville (21-195-0002)	
								2/8/2018	2/9/2020
								Somerset (21-199-0003)	
								1/1/2021	1/1/2021

APPENDIX G

CALVERT CITY SPECIAL-PURPOSE MONITORING

Appendix G
Calvert City Special-Purpose Monitoring

With the cooperation of EPA, KDAQ has established a special-purpose monitoring study of volatile organic compounds (VOCs) near Calvert City, KY. The measurement goal of the study was to estimate the 24-hour concentrations of VOCs in ambient air, over the course of one-year of sampling, with a focus on five pollutants of interest:

- Ethylene Dichloride
- Vinyl Chloride
- 1,3-Butadiene
- Acrylonitrile
- Benzene

VOC sampling consisted of twenty-four hour samples collected in a 6-liter stainless steel canisters (sub-atmospheric) on a predetermined sampling frequency. Samples were analyzed for the full-suite of Tier I and Tier II VOCs by EPA's national contract laboratory, Eastern Research Group. Monitoring and analysis of samples were conducted in-accordance with EPA Method TO-15. Data collected for the one year sampling period was used to conduct a health-risk assessment by EPA.

To determine the best potential locations for ambient monitoring sites near the Calvert City Industrial Complex, KDAQ and EPA utilized air dispersion modeling conducted by EPA Region 4. The modeling was performed with KDAQ emissions data from 2013-2017 for ethylene dichloride and vinyl chloride. Ultimately, it was determined, that the study would necessitate that three sites be established in the vicinity of Calvert City. Additionally, EPA and KDAQ agreed that the study would incorporate meteorological instrumentation and collocated VOC sampling for precision estimates.

KDAQ began collecting VOC samples on October 24, 2020. Since the QAPP required one full year of sampling, with at least 12 complete months, EPA and KDAQ agreed that the risk assessment should encompass data collected between October 24, 2020, and December 31, 2021. However, the meteorological instrumentation was shut down on December 31, 2021, due to safety concerns. KDAQ currently has no plans to collect meteorological data but will continue to monitor VOCs in the Calvert City area. Information about the risk study conduced by EPA can be found at https://www.epa.gov/ky/calvert-city-kentucky-air-monitoring.

Study sites are summarized below:

Calvert City Study: Site & Monitor Summary						
Site/AQS ID/ Coordinates	**Objective**	**Sampling Instruments**	**Sampling Media**	**Monitor Type**	**Sampling Schedule**	**Monitor Purpose**
LWD Collocated & Meteorological Site (LWD) 21-157-0021 37.047906, -88.338347	Maximum Expected Ethylene Dichloride Concentration and Meteorology	Xonteck 911a	6-Liter stainless steel canister	Primary and collocated	Primary-Every 6 days; Collocated-Every 12 days	Characterization of maximum EDC concentration
		RM Young 05305V	n/a	n/a	Continuous	Characterization of wind speed/direction, representative of entire study area (Terminated 12/31/21)
Johnson-Riley Road (JRR) 21-157-0020 37.041179, -88.351889	Maximum Expected Vinyl Chloride Concentration	Xonteck 911a	6-Liter stainless steel canister	Primary	Every 6 days	Characterization of maximum vinyl chloride concentration
Calvert City Elementary (CCE) 21-157-0018 37.026746, -88.343747	High Air Toxics Concentration in Area of Expected Population Exposure	Xonteck 911a	6-Liter stainless steel canister	Primary	Every 6 days	Characterization of air quality in more heavily populated area

APPENDIX H

NEAR-ROAD MONITORING

Appendix H
Near-Road Monitoring

Appendix D 40 CFR Part 58 requires one near-road monitor in CBSAs with a population of 1,000,000 or more. A second near-road monitor is required in CBSAs that have a population greater than 2,500,000, or have a population of 500,000 or greater and have a traffic segment with an AADT of 250,000 or more.

Based upon population estimates and AADT counts, near-road monitors are required in two CBSAs. Neither require a second near-road monitor at this time.

CBSA Name (500,000 or more people)	2024 CBSA Population Estimate*	Highest Road Segment 2-Way AADT for CBSA**	Number of Monitors Required in CBSA
Cincinnati-Middletown, OH-KY-IN	2,302,815	196,929	1
Louisville-Jefferson County, KY-IN	1,394,234	175,095	1

CBSA 2024 population estimate data obtained from the US Census Bureau. Annual Resident Population Estimates and Estimated Components of Resident Population Change for Metropolitan and Micropolitan Statistical Areas and Their Geographic Components for the United States: April 1, 2020 to July 1, 2024 (CBSA-EST2024-ALLDATA). Accessed 3/20/25.
**Source: KYTC Traffic Database. http://datamart.business.transportation.ky.gov/EDSB_SOLUTIONS/CTS/.

The determination of the final locations of near-road monitoring locations within these CBSAs was a cooperative effort between multiple State and Local Agencies. The exact location of each site was determined using the following criteria:

- Fleet mix
- Roadway design
- Traffic congestion patterns
- Local topography
- Meteorology
- Population exposure
- Employee and public safety
- Site logistics

The requirement for a near-road site in the Cincinnati, OH-KY-IN MSA is fulfilled by a Memorandum of Agreement (MOA). The site is located in Ohio and is operated by the Southwest Ohio Air Quality Agency.

The near-road site in the Louisville/Jefferson County, KY-IN MSA has been established and is operated by the Louisville Metro Air Pollution Control District (LMAPCD). Specifics regarding this site are included in the site detail pages of this Annual Network Plan.

APPENDIX I

KENTUCKY SO_2 PWEI VALUES

Appendix I
Kentucky SO_2 PWEI Values

Section 4.4 of Appendix D to 40 CFR Part 58, requires that a population weighted emissions index (PWEI) be calculated by States for each core based statistical area (CBSA) in order to determine the minimum number of SO_2 monitors required. Monitors satisfy minimum requirements if the monitor is sited within the boundaries of the CBSA and is one of the following site types: population exposure, maximum concentration, source-oriented, general background, or regional transport. PWEI based monitors were originally required to be established in the Annual Network Plan (ANP), which was to be submitted to the EPA no later than July 1, 2011. New monitors were to be operational no later than January 2013.

The PWEI is calculated by multiplying the population of each CBSA and the total amount of SO_2, in tons per year, that is emitted within the CBSA, based upon aggregated county level emissions data from the National Emissions Inventory (NEI). The result is then divided by one million to provide the PWEI value, which is expressed in a unit of million persons-tons per year.

The minimum number of monitors required are:

- 3 monitors in CBSAs with index values of 1,000,000 or more;
- 2 monitors in CBSAs with index values less than 1,000,000 but greater than 100,000; and
- 1 monitor in CBSAs with index values greater than 5,000.

Additionally, the EPA Regional Administrator (RA) may at their discretion require additional SO_2 monitors, beyond the minimum number required by PWEI calculations. Additional monitors may be required in situations where an area has the potential to violate or contribute to a violation, in areas that are impacted by sources that cannot be modeled, and in areas with sensitive populations. Kentucky currently does not have any Regional Administrator required SO_2 monitors.

Based upon Kentucky's calculated PWEI values, the following CBSAs require SO_2 monitors:

Kentucky CBSAs	PWEI* (10^6 persons-tons per year)	Number of SO_2 Monitors Required	Number of SO_2 Monitors Present	Kentucky Site Name	Site ID
Cincinnati-Middletown, OH-KY-IN	78,560.5	1	6**	Northern Kentucky University	21-037-3002
Louisville-Jefferson County, KY-IN	8,550.3	1	4***	Algonquin Parkway (LMAPCD) Watson Lane (LMAPCD) Cannons Lane (LMAPCD)	21-111-1041 21-111-0051 21-111-0067

* PWEI calculated from 2024 USCB Population Estimates and 2020 NEI.
** Additional monitors operated by SWOAQA in Ohio.
***Monitors operated by the Louisville Metro Air Pollution Control District and by IDEM in Indiana.

APPENDIX J

EPA CASTNET STATIONS IN KENTUCKY

Appendix J
EPA CASTNET Stations in Kentucky

The Clean Air Status and Trends Network (CASTNET) is a nation-wide, long-term monitoring network designed to measure acidic pollutants and ambient ozone concentrations in rural areas. CASTNET is managed collaboratively by the Environmental Protection Agency – Clean Air Markets Division (EPA), the National Park Service – Air Resources Division (NPS), and the Bureau of Land Management – Wyoming State Office (BLM-WSO). In addition to EPA, NPS, and BLM-WSO, numerous other participants provide network support including tribes, other federal agencies, States, private land owners, and universities. More information about CASTNET can be found at: https://www.epa.gov/castnet

KDAQ does not operate nor serve as the Primary Quality Assurance Organization for any site in the CASTNET network. However, KDAQ does maintain a cooperative relationship with the staff of Mammoth Cave National Park. At the request of KDAQ, the NPS has designated the ozone monitor as the "Maximum O_3 Concentration" site for the Bowling Green, KY MSA. More information about the Mammoth Cave site can be found in the site detail pages of the Annual Network Plan.

Clean Air Status & Trends Network (CASTNET)

Kentucky Ozone Monitors

Monitor ID	Monitor Name	County/ Metropolitan Statistical Area	Designation	Monitoring Scale
21-061-0501	Mammoth Cave National Park	Edmonson/ Bowling Green, KY MSA	CASTNET Non-EPA Federal Maximum O_3 Concentration*	Regional
21-175-9991	Crockett	Morgan/ Not in a MSA	CASTNET EPA	Regional
21-229-9991	Mackville (POC 1)	Washington/ Not in a MSA	CASTNET EPA	Regional
21-229-9991	Mackville Collocated (POC 2)	Washington/ Not in a MSA	CASTNET- QA Collocated** EPA	Regional

* Maximum Ozone Concentration Site for the Bowling Green, KY MSA

**Not usable for NAAQS comparisons

APPENDIX K

WAIVER REQUESTS

Appendix K
Waiver Requests

Hazard (21-193-0003)

The Hazard site is equipped with ozone and a continuous $PM_{2.5}$ FEM (T640). The ozone and T640 are both housed inside a shelter with inlets extending above the roof of the shelter (Figure 1). The shelter is slightly elevated from the ground on blocks, which sits on a mixture of gravel and vegetative ground cover. The site is located near the horse ring on the grounds of the Perry County Park located at 354 Perry Park Road, Hazard, KY. Horse Park Road, an access road to the horse ring, approximately 100m in length, runs west of the site (Figure 2). The T640 and ozone inlets are, respectively, 11.8m and 12.2m, from the edge of Horse Park Road. Road distance limits can be found in 40 CFR Part 58, Appendix E, Figure E-1 and Table E-1. Distances from the road for both inlets, monitor designation, spatial scale, and allowable road distance is shown in Table 1. The T640 violates the distance limits specified in Appendix E.

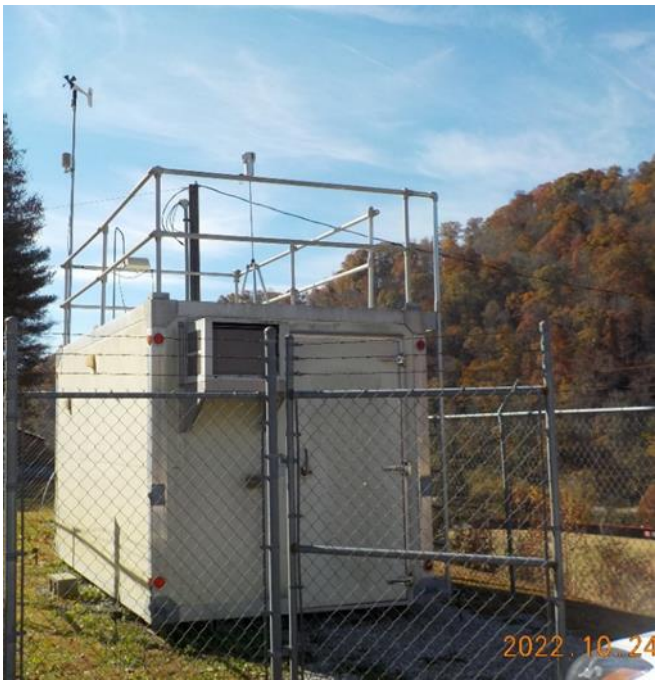

Figure1: Picture of the Hazard air monitoring station.

Figure 2: Google Earth image of the Hazard site in relation to Horse Park Road.

Monitor	Designation	Spatial Scale	Road Distance	Minimum Road Distance Requirement
Ozone	SLAMS AQI Episode	Urban	12.2m	10m
T640	SLAMS AQI	Neighborhood	11.8m	15m

Table 1: Monitor information for the Hazard site.

Appendix K
Waiver Requests

Hazard (21-193-0003)

A traffic count is not available for Horse Park Road. Until recently, traffic on Horse Park Road was minimal, as it only leads to a pavilion and the horse ring. At the end of August 2022, trailers were installed near the shelter, as the park had become a temporary FEMA site after the historic flooding that occurred in July 2022. The area was occupied from August 2022 until March 2024. The site is being utilized again to house displaced families from flooding that occurred in February 2025.

The closest road with a traffic count is Park Avenue (138m) with a traffic count of 3,674 (Figure 3). Appendix E does not clearly define what is considered a road. Upon site setup and until recently, what is now known as Perry Park Road (previously West Davidson Road), was considered the closest road to the site at around 32m. Perry Park Road runs the length of the park, giving people access to its amenities. Horse Park Road is a small offshoot of Perry Park Road, giving access to a small area at the northernmost end of the park. After discussion with EPA Region 4, it was concluded that a waiver request should be submitted with the 2023 Network Plan as a precaution. EPA granted the request in 2023 with a renewal required in the 2025 Network Plan.

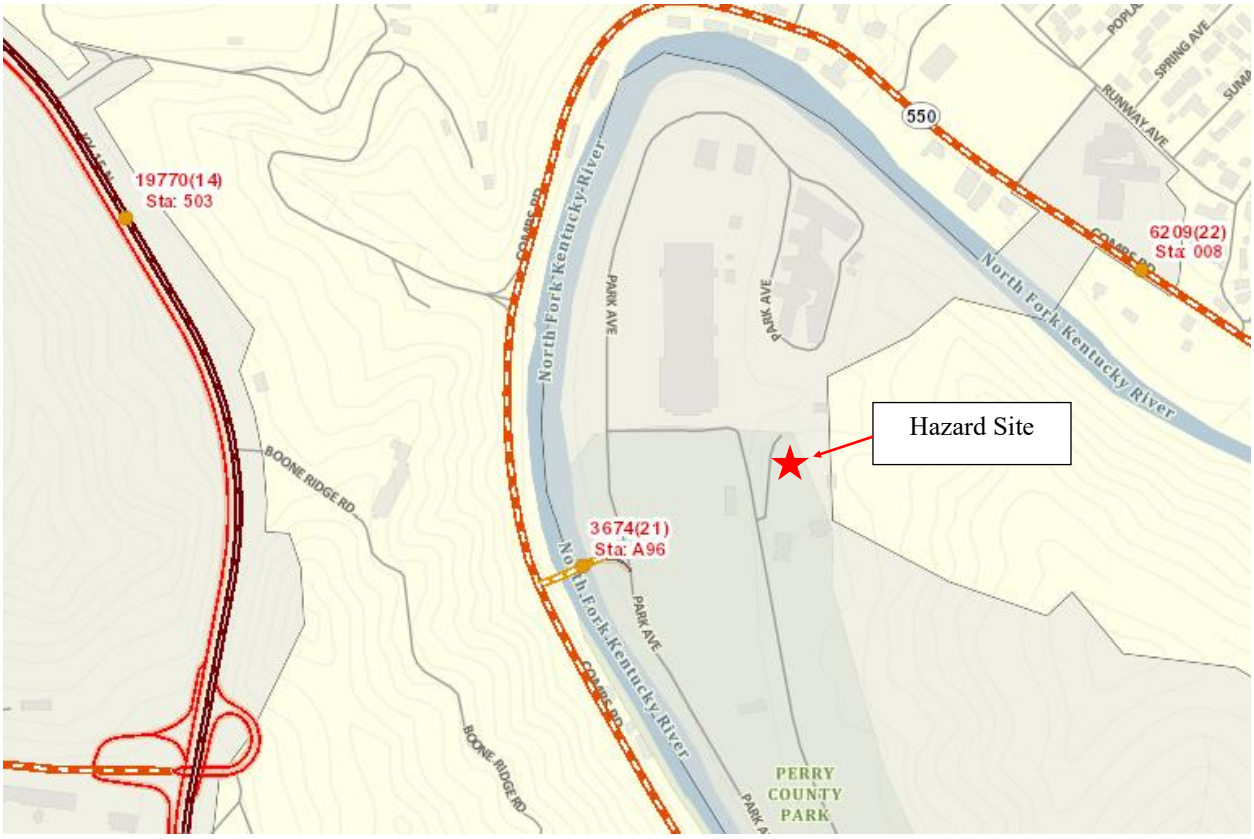

Figure 3: Traffic counts for roads near the Hazard site. Obtained from the Kentucky Transportation Cabinet website.

Appendix K
Waiver Requests

Hazard (21-193-0003)

The shelter cannot be relocated on the property due to limited space, siting from obstructions, complex geography, and pre-established used. The T640 cannot be repositioned in the shelter to meet the 15m minimum distance requirement. Establishment of a new site would take considerable time, resources, and would be costly. Hazard has been in operation since April 1, 2000, and it would be unfortunate to lose a well established site with two and half decades of data. While KDAQ is not in the process of relocating the site, this option is under consideration as it appears that the area might continue to be utilized in the event of large scale natural disasters. Questions have been raised about the impact from traffic and the trailers, however, the only notable impacts have been during the initial set up of the trailers and a burning event where a representative of the Hazard Field Office talked to the residents. Therefore, KDAQ is requesting a waiver for minimum road distance requirements stated in 40 CFR Part 58, Appendix E Figure E-1 of the continuous $PM_{2.5}$ FEM (T640) monitor.

Appendix K
Waiver Requests

Somerset (21-199-0003)

The Somerset site is equipped with ozone and a continuous $PM_{2.5}$ FEM (T640) monitor. Both monitors are housed inside a shelter with inlets extending above the roof (Figure 1). The shelter is stationed on a concrete pad located on the property edge of the Somerset Gas Service Storage Building located at 305 Clifty Street, Somerset, KY. A dead end road that is approximately 100m in length, Johnson Street, runs east of the site (Figure 2). The T640 and ozone inlets are, respectively, 10.05m and 11m from the edge of Johnson Street. Road distance limits can be found in 40 CFR Part 58, Appendix E, Figure E-1 and Table E-1. Distances from the road for both inlets, monitor designation, spatial scale, and allowable road distance is shown in Table 1. The T640 violates the distance limits specified in Appendix E.

Figure1: Picture of the Somerset air monitoring station.

Figure 2: Google Earth image of the Somerset site in relation to Johnson Street. The road dead ends just past two houses located northeast of the site.

Monitor	Designation	Spatial Scale	Road Distance	Minimum Road Distance Requirement
Ozone	SLAMS AQI	Urban	11m	10m
T640	SLAMS AQI	Neighborhood	10.05m	15m

Table 1: Monitor information for the Somerset site.

Appendix K
Waiver Requests

Somerset (21-199-0003)

A traffic count is not available for Johnson Street; however, since it does not have an outlet and there are only two houses on the street, the traffic count is negligible. Realistically, traffic in and out of the warehouse compound is higher than the traffic on Johnson Street. The closest road with a traffic count is Ogden Street (177m) with a traffic count of 7,102 (Figure 3). Appendix E does not clearly define what is considered a road. KDAQ has considered Johnson Street to act as a driveway since it dead-ends and only leads to two houses. Historically, the closest road was considered Clifty Street at around 47m. After discussion with EPA Region 4, it was concluded that a waiver request should be submitted with the 2023 Network Plan as a precaution. EPA granted the request in 2023 with a renewal required in the 2025 Network Plan.

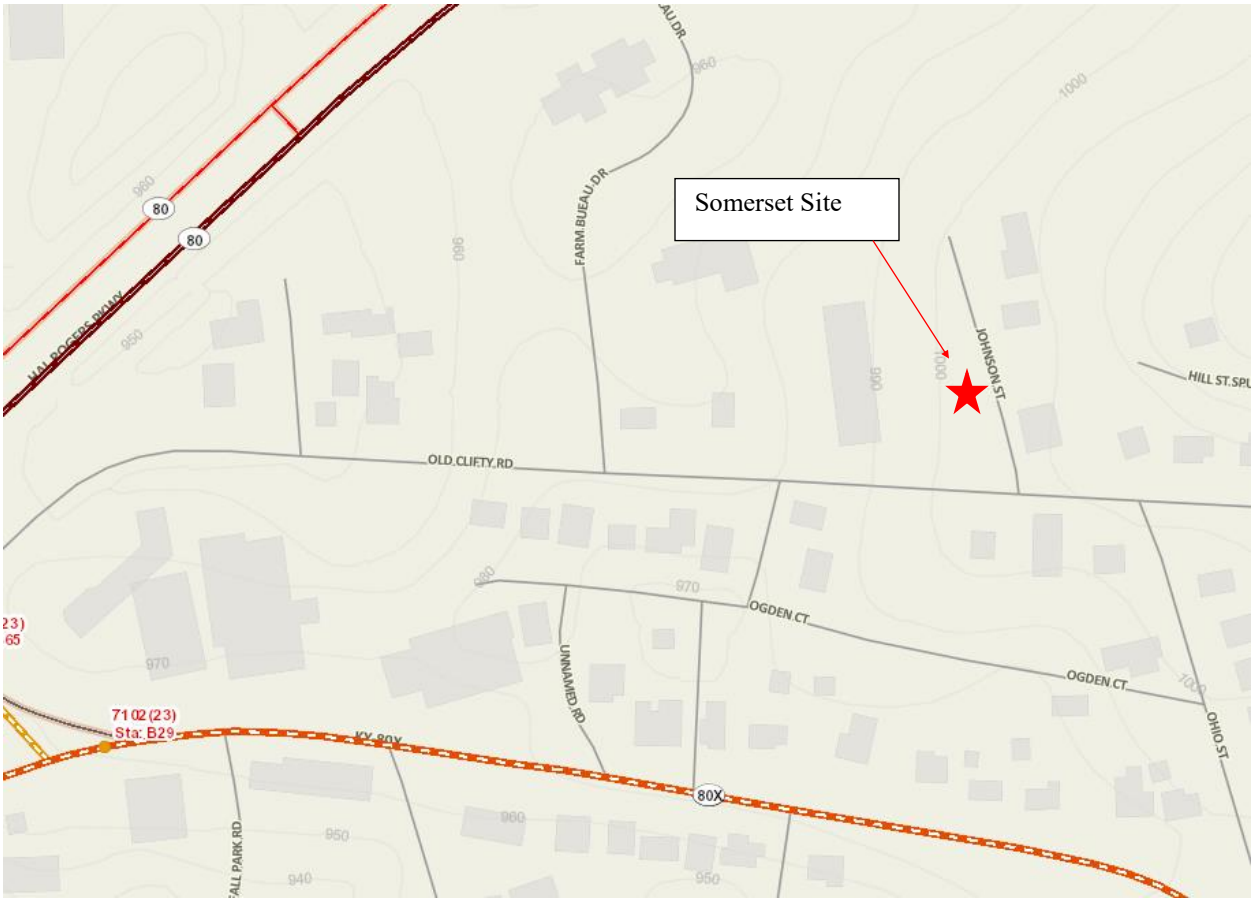

Figure 3: Traffic counts for roads near the Somerset site. Obtained from the Kentucky Transportation Cabinet website.

The shelter cannot be relocated on the property due to other use and low-lying ground. The inlets are already positioned on the side of the shelter opposite the road and cannot be moved to increase road distance. Establishment of a new site would take considerable time, resources, and would be costly. Of greater significance would be the loss of a well-established site, as Somerset began operation on February 14, 1992. Impact from Johnson Street is minimal to negligible, as such, KDAQ is requesting a waiver for minimum road distance requirements stated in 40 CFR Part 58, Appendix E Figure E-1 for the continuous $PM_{2.5}$ FEM (T640) monitor.

APPENDIX L

PUBLIC COMMENTS

KENTUCKY DIVISION FOR AIR QUALITY
AMBIENT AIR MONITORING NETWORK
Comments Received

A public comment period on the KENTUCKY ANNUAL AMBIENT AIR MONITORING NETWORK PLAN 2025 was held from May 21, 2025, through June 20, 2025.

One individual, James Bowen, submitted comments regarding ambient air monitoring for the Commonwealth of Kentucky. Due to the length of the comment, recommendations presented in the comment document will be restated and addressed below. The Kentucky Division for Air Quality (the Division) is responding first, followed by the Louisville Metro Air Pollution Control District (LMAPCD or APCD). The complete comment document as submitted is attached in the pages that follow the 'comment summary and response' by the Division and APCD.

Summary of Comments
Commentor: James Bowen
Responder: The Division

1. **Comment/Recommendation:** Continue to clearly link the network design to federal requirements (e.g. NAAQS compliance, 40 CFR Part 58). Consider adding a brief statement distinguishing EPA ambient standard from OSHA workplace standards, to clarify the plan's public health focus. Ensure future plans maintain comprehensive station data per 40 CFR 58.10 and highlight any regulatory changes (such as new EPA monitoring rules) that may affect network requirements.

   Response: The Division adheres to 40 CFR 58.10, which addresses the annual monitoring network plans.

2. **Comment/Recommendation:** Maintain thorough documentation of site compliance with 40 CFR Part 58 Appendix E (siting criteria) and proactively seek EPA waivers where criteria cannot be met due to geographic constraints. It is recommended to periodically evaluate whether such sites can be improved or relocated; for example, if the Hazard or Somerset sites remain in use long-term, explore modest relocations on the property to fully meet siting distances once emergency use of adjacent areas ends. Continue to use the standardized station description format and consider adding a quick-reference table of each site's key designations (scale, objective, EPA site type) to facilitate review of network adequacy against EPA's siting requirements.

   Response: All sites within the network are evaluated annually. The Division requests waivers from EPA as needed per 40 CFR Part 58. Relocating a site is a costly and time-consuming process, typically only done if there is no way to remedy an issue or if other circumstances force departure.

3. **Comment/Recommendation:** No major expansions to criteria pollutant coverage are federally required at this time, but a few improvements are advisable. First, consider

establishing permanent air toxics monitoring (or recurring special studies) in communities near major chemical or petrochemical facilities (e.g. Calvert City, Catlettsburg) to supplement the one-time studies. Even low-cost sensor networks or periodic canister sampling could help track volatile organic compounds in these areas over time. Second, where modeling was used in lieu of SO_2 or NO_2 monitors around large point sources, periodically evaluate if model assumptions remain valid – if industrial operations change significantly, a temporary monitor could verify actual concentrations. Third, continue close coordination with neighboring states through MOAs to ensure interstate air basins (e.g. Cincinnati, Huntington-Ashland) retain sufficient monitors; jointly review if any new near-source issues (like increased riverport traffic or new industrial projects) warrant additional stations on either side of state lines. Lastly, although the RadNet radiation monitors are outside DAQ's network, Kentucky could work with EPA to site an additional RadNet station in the western part of the state for more direct coverage of the PGDP vicinity or the Louisville region. This would enhance early detection of any radiological releases and improve spatial coverage of that federal network.

Response: The Division appreciates that the toxics monitoring network could be improved, however, additional monitors or sites must be budgeted and planned for in advance. Currently, further expansion beyond the present monitoring is not funded. The MOA for the Clarksville, TN-KY MSA has recently been updated and the Division is currently working on updating additional MOAs. The Division would like to add that there is a RadNet monitor located in western Kentucky, in Livingston County, at the Smithland site (21-139-0003).

4. **Comment/Recommendation:** The $PM_{2.5}$ network is generally strong. It is recommended to maintain the existing FRM samplers for data continuity and QA (e.g. for use in comparisons and possible designation purposes), while continuing to leverage continuous FEM data for public reporting and health forecasting. Kentucky should consider expanding $PM_{2.5}$ monitoring in any growing communities or industrial areas currently with marginal coverage – for example, adding a permanent continuous $PM_{2.5}$ monitor closer to the Calvert City complex if future risk assessments warrant it. Additionally, as older FRM units age, the Division should plan for their replacement or upgrade (possibly with FEM units that can operate in a filter-sampling mode if needed for collocation). Finally, ensure all continuous monitors remain properly correlated to FRM methods (e.g. via annual collocated sampling or calibration checks) so that data remains NAAQS-comparable. By continuing to modernize instruments and filling small spatial gaps, Kentucky can keep its $PM_{2.5}$ network aligned with best practices and ready for any future tightening of standards.

   Response: The Division meets $PM_{2.5}$ network requirements and does not have any plans to discontinue any FRM or FEM samplers. A continuous FEM monitor was recently added to the Nicholasville (21-113-0001) site due to increased population and the need for another monitor in the Lexington-Fayette, KY MSA per requirements found in 40 CFR Part 58 Appendix D. Collocation requirements are followed per 40 CFR Part 58 Appendix A. The Division appreciates that the monitoring network could be enhanced, however, additional monitors or sites must be budgeted and planned in advance.

5. **Comment/Recommendation:** Continue operating the existing PM_{10} sites to maintain long-term data records, especially if any are used for lead/metals analysis or background reference. The state should evaluate upgrading one or two manual PM_{10} stations to continuous "dual-channel" monitors (like the Teledyne T640X or BAM PM_{10}) in the future. Priority for such an upgrade could be given to a site in an area with potential for rapidly changing coarse dust levels (for example, in Owensboro or Paducah if industrial dust or agricultural burns are concerns). This would improve real-time awareness of dust events and allow AQI reporting for PM_{10} if needed. Additionally, keep an eye on areas with new construction, mining, or demolition activities – deploying temporary PM_{10} sensors or portable monitors in those areas could preempt any NAAQS issues. Overall, the PM_{10} network meets federal requirements, but incremental modernization (moving away from purely intermittent sampling) is recommended.

   Response: The Division meets PM_{10} network requirements and does not plan on shutting down any PM_{10} sites. Intermittent FRMs are used for both PM_{10} monitoring and metals analysis. Any additional monitors or sites must have appropriate funding and planning before being implemented.

6. **Comment/Recommendation:** The ozone network is robust and well-aligned with EPA requirements. It is recommended to continue operating all current ozone monitors given their value for both NAAQS compliance and regional air quality mapping. No sites appear redundant; in fact, each often serves a unique directional coverage (urban center vs. downwind suburb vs. regional background). Kentucky should maintain the "maximum ozone" site designations and ensure those sites have the proper trace-level instrumentation and calibration (peak ozone sites can experience high values that need accurate capture). For the PAMS program, Louisville should work to fully optimize the automated VOC gas chromatograph and meteorological profiler to maximize data capture each ozone season. The plan already notes improvements in reporting; continued training and staffing support for PAMS will be important, as these enhanced measurements are complex. If any additional resources are available, Kentucky could consider deploying portable ozone monitors or additional PAMS sensors during episodic events or studies (for instance, a short-term deployment in the Paducah region during high-ozone days to see transport from upwind states). This isn't a requirement, but it could help verify that no uncovered area is experiencing unreported high ozone. Lastly, as EPA is reconsidering the ozone NAAQS, the state should be prepared for potential lowering of the standard – which might necessitate even greater spatial resolution of ozone monitoring. Proactively evaluating areas just meeting the current standard (like parts of central KY) for any needed additional monitors would put Kentucky ahead of the curve.

   Response: The Division agrees that the ozone network is robust and does not have any plans to discontinue any ozone monitors at this time. Should the ozone standard be lowered, the Division will ensure that minimum monitoring requirements are met. Currently, the Division operates more ozone monitors than what is required by 40 CFR Part 58 Appendix D.

7. **Comment/Recommendation:** The current NO_2 monitoring network is compliant and generally adequate. It is strongly recommended to **continue operating the Louisville near-road NO_2 site** (Durrett Lane) as it provides critical data on worst-case NO_2 from traffic for both NAAQS compliance and public health information. Louisville should also maintain the trace-level NO_2/NOy at the NCore site for understanding urban background and regional transport of nitrogen oxides. For Lexington and other mid-size cities, Kentucky should consider deploying a short-term near-road NO_2 monitor or passive samplers to ensure those areas truly have ample margin below the NAAQS. Even if not permanent, a one-year study near Lexington's busiest highway (I-75/I-64 corridor) would provide valuable confirmation that no monitoring is needed there – essentially a data-backed waiver. Additionally, as vehicle fleets get cleaner, Kentucky might coordinate with EPA Region 4 to possibly **request a waiver or discontinuation** of certain NO_2 sites in the future if data trends are consistently very low (EPA has in recent years allowed some near-road NO_2 sites to shut down in cleaner areas). Any such decision should be made with multi-year data and EPA approval. For now, no network reduction is advised, but Kentucky can start evaluating long-term NO_2 data to optimize the network by the next 5-year assessment. Finally, continue to report NO_2 data to the public (e.g. via AIRNow) even if AQI levels are "Good" – this transparency helps validate the success of pollution controls in Kentucky's cities.

   Response: The Division meets NO_2 monitoring network requirements. The Division appreciates that the monitoring network could be improved, however, additional monitors or sites must have appropriate funding and planning before being implemented.

8. **Comment/Recommendation:** The SO_2 monitoring network should be maintained at least at its current scope until the EPA and state are confident all major sources' impacts are accounted for via permanent emissions reductions. Kentucky should continue operating the Henderson DRR monitor as long as the associated source (the power station) is active, to provide assurance of ongoing attainment. If any modeled source area in Kentucky is near the 1-hr SO_2 standard, the state should consider adding a monitor or enhanced SO_2 tracking there to verify model predictions. For example, if the Big Rivers-Deer Run (formerly D.B. Wilson) station in Ohio County or the Ghent plant in Carroll County still emit significant SO_2 but were handled by modeling, a periodic field study or SO_2 sensor could be prudent to validate no hotspots exist. Conversely, if some SO_2 monitors have shown years of very low values (e.g. Louisville's urban SO_2 might be consistently low after coal unit retirements), the state could evaluate whether all are still needed or if some could be moved to new locations of interest. Any network optimization should be done in consultation with EPA. Lastly, the state should keep up with EPA's SO_2 NAAQS review – if the standard becomes more stringent, previously "safe" areas might need renewed attention. In summary, the current network meets requirements and is well-targeted; ongoing vigilance and minor adjustments in response to the evolving energy landscape (coal plant closures vs. any new combustion sources) are recommended.

   Response: The Division meets SO_2 monitoring network requirements and does not have any plans to shut down the Sebree DRR monitor (21-101-1011). Should the NAAQS be

revised, as it was in December 2024, or the CFR change, the Division will adapt the network accordingly.

9. **Comment/Recommendation:** Continue operating the Louisville CO monitors for long-term trend data and as part of the NCore and near-road pollutant suite. These instruments also serve as a form of "insurance" in case of unusual events (for instance, a downtown traffic jam under inversion or a local emergency involving fire – CO monitors could detect any acute spikes). For the rest of the state, dedicated CO monitors are not necessary unless a specific localized concern arises (e.g. if a city hosts an event that traps lots of vehicles in tunnels or parking garages – then temporary CO monitoring might be warranted). The state should periodically review traffic and emission data; if, in the future, Lexington's downtown were to develop features that might elevate CO (like more high-rises creating street canyons), they might revisit adding a CO sampler, but currently that's not indicated. In summary, the CO monitoring is slim but sufficient. The recommendation is mostly to **maintain the status quo**, calibrate and QA/QC the existing CO analyzers diligently (trace CO instruments can drift at low levels), and use the data for model validation and public information. Should any CO monitor show readings approaching even half the NAAQS (which is unlikely), that would prompt investigation and possibly re-introduction of more CO monitoring; otherwise, Kentucky can focus resources on pollutants of more concern.

   Response: While the Division does not operate any CO monitors, CO monitoring meets network requirements. LMAPCD currently operates two CO monitors in Jefferson County.

10. **Comment/Recommendation:** The current lead monitoring setup meets federal requirements. It is recommended to continue the lead/TSP sampling at the designated sites at least on a 6-day schedule, as required, to ensure any unforeseen rise in lead levels would be caught. Given the low concentrations, QA is crucial – maintaining rigorous filter handling and low detection limit labs will keep the data meaningful. If any new industry with potential lead emissions opens in Kentucky, the state should be ready to deploy a source-oriented Pb monitor (for instance, a proposed battery recycling plant or ammunitions manufacturer would trigger this). In terms of broader metals monitoring, Kentucky could formalize a plan for periodically screening filters from different sites for toxic metals (this might already be happening as implied). For example, it would be beneficial to analyze a subset of $PM_{2.5}$ or PM_{10} filters for metals in industrial areas to track pollutants like manganese (near steel or alloy plants), hexavalent chromium (near plating operations), etc. This can be done through special studies or partnership with EPA's regional laboratory. Overall, no increase in routine lead monitors is necessary unless a new source appears, but maintaining analytical capability and vigilance is key. Finally, even though Louisville has no dedicated Pb monitor (since no source), the state could consider leveraging its metals analysis to include a site in Louisville occasionally for completeness. This would ensure that if any minor lead sources (like general aviation airports using leaded avgas) exist, their impact is not entirely unmonitored. In summary, **keep the two Pb sites active, and remain poised to adjust if industrial profiles change.**

    Response: The Division meets Pb monitoring network requirements and does not have any plans to shut down the Eastern Kentucky University site (21-151-0005).

11. **Comment/Recommendation:** Kentucky should sustain and potentially expand its air toxics monitoring efforts to ensure comprehensive coverage of hazardous pollutants. **For Louisville:** Continue the Rubbertown community monitoring and consider upgrading it into a more permanent neighborhood air toxics station, if resources allow. The success of reducing 1,3-butadiene in Louisville (due to industrial controls) was driven by having monitoring data; maintaining some level of HAP monitoring in that area will ensure levels remain in check. **For state-wide coverage**: Evaluate whether any city or region with significant industrial or traffic emissions might merit joining EPA's NATTS program or a state-equivalent toxics network. For example, a long-term toxics station in Ashland or Calvert City could serve as a trend site to track progress (post-study in Calvert City, perhaps a lighter sampling schedule could be continued). Partnering with EPA or universities for a pilot fenceline monitoring project at the Marathon refinery could also provide ongoing VOC data to the community. In the interim, Kentucky can leverage low-cost technologies: emerging passive samplers and small sensor systems for certain VOCs or benzene could be deployed near facilities on a rotating basis as a "survey." The plan already mentions exploring low-cost sensors and special projects – this should explicitly include sensors for HAPs, not just criteria pollutants. Data from any such sensors, while not FEM quality, can identify spikes or leaks that warrant more detailed follow-up.

    In summary, **build on the PAMS and special studies platform**: keep PAMS VOC/carbonyl monitoring fully operational (including data reporting to EPA AQS as Louisville is now doing), reinstitute periodic toxics studies in known hotspots (perhaps every few years to check trends in Calvert City, Ashland, etc.), and consider establishing at least one permanent multi-HAP monitoring site outside Louisville to serve as a reference for rural/industrial air toxics levels in Kentucky. These steps will strengthen the network's ability to catch non-criteria pollutants that can affect health.

    Response: The Division acknowledges that toxics monitoring could be improved, however, additional monitoring must be budgeted and planned for in advance. Currently, further expansion beyond the present monitoring is not funded. No changes are currently planned for any air toxics monitoring.

12. **Comment/Recommendation:** Continue the operation of the black carbon monitor at the Louisville near-road site, and ensure its data is utilized in assessing trends in diesel pollution and in public communications (e.g. Louisville can show community that diesel soot levels are being tracked). For PAHs, evaluate the current monitoring objectives: if the one PAH sampler is yielding data used in a risk assessment or compliance (some states have state PAH ambient standards), then maintain it. If not, perhaps repurpose it or relocate it periodically to gather data from different locations. For instance, one year focus on West Louisville, next year move PAH sampler to Ashland area, etc., to map PAH distribution. If feasible, using newer tech like a real-time PAH monitor (e.g. PAS or PUF sampler with shorter cycles) could provide better temporal resolution than integrated filters.

    In the broader sense, Kentucky might incorporate these particulate toxics metrics into its **data reporting standards**: e.g., share annual summaries of black carbon and PAH levels

in the network plan or websites, to highlight these non-regulated pollutant trends. Even though not required, this transparency builds public trust. Considering OSHA, PAHs and diesel particulate are occupational concerns (diesel exhaust is classified as a carcinogen), so by monitoring black carbon in ambient air, Kentucky is indirectly also addressing an occupational health interest for outdoor workers. If black carbon levels drop due to cleaner engines, both community and worker exposures benefit.

Response: The Division acknowledges the comment. The black carbon monitor is operated under LMACPD. The PAH monitor is operated under the Division and is located at the Grayson Lake site (21-043-0500). PAH is required as part of the National Air Toxics Trends Station (NATTS) network.

13. **Comment/Recommendation:** Keep meteorological stations well-maintained and calibrated (especially wind sensors, which are critical for back-trajectory and dispersion analysis). It's recommended to upgrade any older met equipment to "Air Quality Measurements approved" sensors as noted in the PAMS requirements – Louisville appears to have done so in 2021. Kentucky should ensure each regional office or primary monitoring region has at least one full meteorological station feeding data to both analysts and public archives. For low-cost sensors, the recommendation is to develop a formal framework for using them: for example, deploy sensor networks in communities as an educational tool, or as an early warning system in areas far from official monitors. Any data from such sensors should be vetted and clearly distinguished from regulatory data, but can help identify localized issues (like neighborhood wood smoke, traffic hot-spots, etc.). By the next network assessment, Kentucky could report on any findings from pilot low-cost sensor projects and consider if some might be integrated into public-facing air quality information systems (with appropriate caveats).

    Furthermore, consider enhancing data reporting standards by including meteorological context with air quality alerts (e.g. mention when stagnant winds are causing pollutant build-up). Since the prompt asks about data reporting: Kentucky reports real-time data to EPA AIRNow and their own websites; a recommendation is to also report comparisons to any applicable state standards or guidelines for non-criteria pollutants (like H_2S odor threshold or Air Toxics Reference concentrations) to give the public a fuller picture. For example, Louisville might report when the Algonquin H_2S levels approach the state's odor annoyance standard. This goes slightly beyond federal requirement but is good practice for community engagement.

    Response: The Division appreciates the ideas presented for improvement. Equipment is maintained per specifications in SOPs. Kentucky maintains meteorological equipment where required by specific programmatic requirements, such as at the Grayson Lake NATTS site. It should be noted that regulatory modeling of air quality is conducted using NOAA weather stations. While low-cost sensors do not have as great of a financial impact as FEMs or FRMs, any project of this nature requires adequate funding, planning, and personnel.

14. **Comment/Recommendation: Identified Gaps/Deficiencies:** The review did not find any gross violations or omissions in required monitoring; however, several areas for improvement were noted:

• **Industrial Coverage:** Although major industrial regions are mostly covered, a few could use better monitoring. Notably, Calvert City had only a temporary study for toxic VOCs – there is no permanent station continuously watching that area's emissions. The Ashland/Catlettsburg area might benefit from more routine toxics or particulate monitoring given the refinery and past industries. Similarly, after the Paducah DOE site ceased operations, no criteria pollutant monitors were stationed nearby (understandable since emissions dropped) but radiological monitoring is left to a separate program. The lack of a RadNet station in western KY means any radiological release in that region would rely on distant monitors in central KY. These are not regulatory requirements per se, but gaps in a holistic risk-based coverage.

• **Continuous Monitoring and Technology:** The network could modernize a bit further. For example, PM_{10} is still entirely manual except in Louisville; deploying continuous coarse PM monitors would improve data richness. Some smaller $PM_{2.5}$ sites still use intermittent FRMs – though supplemented by nearby continuous sites, eventually all areas might have real-time $PM_{2.5}$. Kentucky has only one NCore site (Louisville); while only one is required, a second multi-pollutant site in a different setting (e.g. a regional rural site or Lexington urban site) could strengthen data for nationwide programs. However, resource limitations may preclude that.

• **Air Toxics and PAH Monitoring:** Outside of PAMS, the hazardous air pollutant monitoring is limited and not continuous. Communities near certain industries may feel their pollutants of concern (air toxics, odors) are not fully captured by the permanent network, even though Kentucky addresses some via special projects. This can be viewed as a network deficiency in terms of community coverage, if not in federal metrics.

• **Data Reporting:** While Kentucky reports criteria pollutant data to EPA in a timely fashion (and had an honest discussion about delays in initial PAMS data reporting), there is always room to improve transparency. For instance, making all special study results public (the plan references an EPA site for the Calvert City study data) and integrating those findings into future network decisions is important. Also, ensuring the public can easily access real-time H_2S levels, VOC measurements, etc., perhaps via a state dashboard, would be beneficial. This is not a strict deficiency, but an area to enhance.

Response: The Division acknowledges the comment and appreciates the support and interest in the air quality of the Commonwealth. The Division complies with the National Ambient Air Quality Standards (NAAQS), which are written as law in the Code of Federal Regulations. Currently, further expansion beyond the present monitoring is not funded. The Division evaluates on an annual basis if ambient monitoring requirements are met, including ways to expand and improve the network should funds be available. The Division would like to restate that there is a RadNet monitor located in western Kentucky, in Livingston County, at the Smithland site (21-139-0003). The results from the Calvert City

study are publicly available and can be found on EPA's Calvert City, Kentucky Air Monitoring page.

15. **Comment/Recommendation: Recommendations for Improvement:** Based on the above analysis, the following detailed recommendations are offered to strengthen Kentucky's ambient monitoring network:

• **Enhance Monitoring near Key Industrial Facilities:** Consider establishing permanent or semi-permanent monitoring stations in the vicinity of large industrial complexes currently without year-round monitors. Specifically, a dedicated station in Calvert City could continuously measure VOCs (with passive samplers or a small auto-GC) and perhaps $PM_{2.5}$, to provide ongoing data to the community and regulators post-study. In the Ashland area, adding a toxics sampler (e.g. for benzene, toluene, etc.) at the Ashland Primary site or a nearby location in Catlettsburg would directly track refinery emissions impact. Even if run on a rotational basis (one year on, one year off), it would be an improvement. Kentucky should leverage EPA's Community-Scale Air Toxics grants or upcoming federal funding to support such monitors in key fenceline communities.

• **Leverage the Paducah DOE Oversight Data:** While not part of DAQ's network, the Division of Waste Management's AIP monitoring around PGDP generates data on radionuclides, fluoride, and other pollutants. It's recommended that DAQ coordinate with that program to incorporate a summary of air-related findings into the annual network assessment. For example, if the state's independent monitoring around PGDP shows any concerning air concentrations (even of non-NAAQS pollutants like uranium or TCE), DAQ could decide to supplement with its own monitors (like SO_2, $PM_{2.5}$ if diesel generators are used on site, etc.). Essentially, break down silos between programs to ensure ambient air risks are fully addressed. Also, advocate for a RadNet station placement in far western Kentucky – perhaps in Paducah city – to enhance early detection capability for radiological events.

• **Modernize Instruments Where Feasible:** Transition remaining filter-only $PM_{2.5}$ sites to continuous monitors, while retaining filter collection ability via collocation. The plan shows only 3 manual $PM_{2.5}$ samplers left; these could be kept for collocated QA, but primary data could come from FEM units. Acquire a couple of continuous PM_{10} (or combo $PM_{2.5}$/PM_{10}) monitors for state areas – for example, replacing the Owensboro or Ashland PM_{10} HiVol with a BAM1020 or Teledyne T640x. This would align Kentucky with the growing practice of continuous coarse monitoring and provide real-time coarse dust data (useful for public dust complaints or events like Saharan dust incursions).

• **Expand Near-road and Localized Monitoring:** Evaluate whether additional near-road monitoring is needed in a growing urban area like Lexington. If NO_2 and CO are indeed very low, a compromise could be to deploy a $PM_{2.5}$ and black carbon sensor near a busy road in Lexington to see if any notable gradient exists relative to the city's existing background site. This low-cost approach, if it finds elevated readings, could justify adding a formal near-road station in the future. In Louisville, beyond NO_2 and CO, consider if the I-264 near-road site should also measure ultrafine particles (UFP) or ammonia – not

required, but some near-road sites do for research. Such data could inform health studies on traffic pollution.

• **Continuous Air Toxics Efforts:** Institutionalize some of the special studies. For instance, make the Calvert City VOC monitoring an every-5-year recurring project to track trends, or maintain a single canister sampler long-term with reduced frequency (e.g. one 24-hr sample a month) to keep a baseline dataset. Do likewise for other areas of concern (Rubbertown – though Louisville does this, perhaps share with state; and maybe one in the eastern KY oil/gas fields or urban Lexington for downtown toxics from vehicles). If resources allow, pursuing a dedicated NATTS site designation for Kentucky (for example, in Louisville or Paducah) would bring federal support and a consistent long-term toxics dataset.

• **Data Transparency and Reporting:** Improve the network's public data reporting by integrating all pollutants. Currently, citizens can readily find AQI for criteria pollutants, but not as easily the data for toxics like benzene or H_2S. Kentucky should consider publishing an annual "State of the Air Toxics" report or an online dashboard that includes summaries of VOC, carbonyl, PAH, and metal measurements, alongside the criteria pollutant statistics. This would align with recommendations in EPA's air monitoring assessment guidance to enhance stakeholder engagement. In doing so, use plain language to explain what the levels mean relative to health benchmarks (EPA risk levels, ATSDR reference concentrations, OSHA limits for context, etc.).

• **Prepare for Future Standards and Emerging Pollutants:** Keep an eye on EPA's ongoing reviews – for example, if the $PM_{2.5}$ annual NAAQS is tightened, Kentucky might need additional neighborhood-scale $PM_{2.5}$ monitors in urban areas to ensure compliance margins. Similarly, if climate change leads to more wildfire smoke impacts in Kentucky, the state might deploy temporary smoke monitors (as done out West) to affected areas. Formaldehyde and ethylene oxide are emerging concerns nationally; Kentucky could pre-emptively include these in lab analyses of air toxics samples to understand background levels. Essentially, build flexibility into the network to monitor new pollutants of concern (even PFAS in air near fire training areas, ammonia near large livestock operations, etc., could be future topics).

Response: The Division acknowledges the comment and appreciates the support and interest in the air quality of the Commonwealth. The Division complies with the National Ambient Air Quality Standards (NAAQS), which are written as law in the Code of Federal Regulations. Currently, further expansion beyond the present monitoring is not funded. The Division evaluates on an annual basis if ambient monitoring requirements are met, including ways to expand and improve the network should funds be available. The Division would like to restate that there is a RadNet monitor located in western Kentucky, in Livingston County, at the Smithland site (21-139-0003).

Summary of Comments
Commentor: James Bowen
Responder: APCD

1. **Comment/Recommendation:** Continue to clearly link the network design to federal requirements (e.g. NAAQS compliance, 40 CFR Part 58). Consider adding a brief statement distinguishing EPA ambient standard from OSHA workplace standards, to clarify the plan's public health focus. Ensure future plans maintain comprehensive station data per 40 CFR 58.10 and highlight any regulatory changes (such as new EPA monitoring rules) that may affect network requirements.

   Maintain thorough documentation of site compliance with 40 CFR Part 58 Appendix E (siting criteria) and proactively seek EPA waivers where criteria cannot be met due to geographic constraints. It is recommended to periodically evaluate whether such sites can be improved or relocated; for example, if the Hazard or Somerset sites remain in use long-term, explore modest relocations on the property to fully meet siting distances once emergency use of adjacent areas ends. Continue to use the standardized station description format and consider adding a quick-reference table of each site's key designations (scale, objective, EPA site type) to facilitate review of network adequacy against EPA's siting requirements.

   No major expansions to criteria pollutant coverage are federally required at this time, but a few improvements are advisable. First, consider establishing permanent air toxics monitoring (or recurring special studies) in communities near major chemical or petrochemical facilities (e.g. Calvert City, Catlettsburg) to supplement the one-time studies. Even low-cost sensor networks or periodic canister sampling could help track volatile organic compounds in these areas over time. Second, where modeling was used in lieu of SO_2 or NO_2 monitors around large point sources, periodically evaluate if model assumptions remain valid – if industrial operations change significantly, a temporary monitor could verify actual concentrations. Third, continue close coordination with neighboring states through MOAs to ensure interstate air basins (e.g. Cincinnati, Huntington-Ashland) retain sufficient monitors; jointly review if any new near-source issues (like increased riverport traffic or new industrial projects) warrant additional stations on either side of state lines. Lastly, although the RadNet radiation monitors are outside DAQ's network, Kentucky could work with EPA to site an additional RadNet station in the western part of the state for more direct coverage of the PGDP vicinity or the Louisville region. This would enhance early detection of any radiological releases and improve spatial coverage of that federal network.

   The $PM_{2.5}$ network is generally strong. It is recommended to maintain the existing FRM samplers for data continuity and QA (e.g. for use in comparisons and possible designation purposes), while continuing to leverage continuous FEM data for public reporting and health forecasting. Kentucky should consider expanding $PM_{2.5}$ monitoring in any growing communities or industrial areas currently with marginal coverage – for example, adding a

permanent continuous $PM_{2.5}$ monitor closer to the Calvert City complex if future risk assessments warrant it. Additionally, as older FRM units age, the Division should plan for their replacement or upgrade (possibly with FEM units that can operate in a filter-sampling mode if needed for collocation). Finally, ensure all continuous monitors remain properly correlated to FRM methods (e.g. via annual collocated sampling or calibration checks) so that data remains NAAQS-comparable. By continuing to modernize instruments and filling small spatial gaps, Kentucky can keep its $PM_{2.5}$ network aligned with best practices and ready for any future tightening of standards.

Continue operating the existing PM_{10} sites to maintain long-term data records, especially if any are used for lead/metals analysis or background reference. The state should evaluate upgrading one or two manual PM_{10} stations to continuous "dual-channel" monitors (like the Teledyne T640X or BAM PM_{10}) in the future. Priority for such an upgrade could be given to a site in an area with potential for rapidly changing coarse dust levels (for example, in Owensboro or Paducah if industrial dust or agricultural burns are concerns). This would improve real-time awareness of dust events and allow AQI reporting for PM_{10} if needed. Additionally, keep an eye on areas with new construction, mining, or demolition activities – deploying temporary PM_{10} sensors or portable monitors in those areas could preempt any NAAQS issues. Overall, the PM_{10} network meets federal requirements, but incremental modernization (moving away from purely intermittent sampling) is recommended.

The ozone network is robust and well-aligned with EPA requirements. It is recommended to continue operating all current ozone monitors given their value for both NAAQS compliance and regional air quality mapping. No sites appear redundant; in fact, each often serves a unique directional coverage (urban center vs. downwind suburb vs. regional background). Kentucky should maintain the "maximum ozone" site designations and ensure those sites have the proper trace-level instrumentation and calibration (peak ozone sites can experience high values that need accurate capture). For the PAMS program, Louisville should work to fully optimize the automated VOC gas chromatograph and meteorological profiler to maximize data capture each ozone season. The plan already notes improvements in reporting; continued training and staffing support for PAMS will be important, as these enhanced measurements are complex. If any additional resources are available, Kentucky could consider deploying portable ozone monitors or additional PAMS sensors during episodic events or studies (for instance, a short-term deployment in the Paducah region during high-ozone days to see transport from upwind states). This isn't a requirement, but it could help verify that no uncovered area is experiencing unreported high ozone. Lastly, as EPA is reconsidering the ozone NAAQS, the state should be prepared for potential lowering of the standard – which might necessitate even greater spatial resolution of ozone monitoring. Proactively evaluating areas just meeting the current standard (like parts of central KY) for any needed additional monitors would put Kentucky ahead of the curve.

The current NO_2 monitoring network is compliant and generally adequate. It is strongly recommended to **continue operating the Louisville near-road NO_2 site** (Durrett Lane) as it provides critical data on worst-case NO_2 from traffic for both NAAQS compliance and public health information. Louisville should also maintain the trace-level NO_2/NOy at

the NCore site for understanding urban background and regional transport of nitrogen oxides. For Lexington and other mid-size cities, Kentucky should consider deploying a short-term near-road NO_2 monitor or passive samplers to ensure those areas truly have ample margin below the NAAQS. Even if not permanent, a one-year study near Lexington's busiest highway (I-75/I-64 corridor) would provide valuable confirmation that no monitoring is needed there – essentially a data-backed waiver. Additionally, as vehicle fleets get cleaner, Kentucky might coordinate with EPA Region 4 to possibly **request a waiver or discontinuation** of certain NO_2 sites in the future if data trends are consistently very low (EPA has in recent years allowed some near-road NO_2 sites to shut down in cleaner areas). Any such decision should be made with multi-year data and EPA approval. For now, no network reduction is advised, but Kentucky can start evaluating long-term NO_2 data to optimize the network by the next 5-year assessment. Finally, continue to report NO_2 data to the public (e.g. via AIRNow) even if AQI levels are "Good" – this transparency helps validate the success of pollution controls in Kentucky's cities.

The SO_2 monitoring network should be maintained at least at its current scope until the EPA and state are confident all major sources' impacts are accounted for via permanent emissions reductions. Kentucky should continue operating the Henderson DRR monitor as long as the associated source (the power station) is active, to provide assurance of ongoing attainment. If any modeled source area in Kentucky is near the 1-hr SO_2 standard, the state should consider adding a monitor or enhanced SO_2 tracking there to verify model predictions. For example, if the Big Rivers-Deer Run (formerly D.B. Wilson) station in Ohio County or the Ghent plant in Carroll County still emit significant SO_2 but were handled by modeling, a periodic field study or SO_2 sensor could be prudent to validate no hotspots exist. Conversely, if some SO_2 monitors have shown years of very low values (e.g. Louisville's urban SO_2 might be consistently low after coal unit retirements), the state could evaluate whether all are still needed or if some could be moved to new locations of interest. Any network optimization should be done in consultation with EPA. Lastly, the state should keep up with EPA's SO_2 NAAQS review – if the standard becomes more stringent, previously "safe" areas might need renewed attention. In summary, the current network meets requirements and is well-targeted; ongoing vigilance and minor adjustments in response to the evolving energy landscape (coal plant closures vs. any new combustion sources) are recommended.

Continue operating the Louisville CO monitors for long-term trend data and as part of the NCore and near-road pollutant suite. These instruments also serve as a form of "insurance" in case of unusual events (for instance, a downtown traffic jam under inversion or a local emergency involving fire – CO monitors could detect any acute spikes). For the rest of the state, dedicated CO monitors are not necessary unless a specific localized concern arises (e.g. if a city hosts an event that traps lots of vehicles in tunnels or parking garages – then temporary CO monitoring might be warranted). The state should periodically review traffic and emission data; if, in the future, Lexington's downtown were to develop features that might elevate CO (like more high-rises creating street canyons), they might revisit adding a CO sampler, but currently that's not indicated. In summary, the CO monitoring is slim but sufficient. The recommendation is mostly to **maintain the status quo**, calibrate and QA/QC the existing CO analyzers diligently (trace CO instruments can drift at low levels),

and use the data for model validation and public information. Should any CO monitor show readings approaching even half the NAAQS (which is unlikely), that would prompt investigation and possibly re-introduction of more CO monitoring; otherwise, Kentucky can focus resources on pollutants of more concern.

The current lead monitoring setup meets federal requirements. It is recommended to continue the lead/TSP sampling at the designated sites at least on a 6-day schedule, as required, to ensure any unforeseen rise in lead levels would be caught. Given the low concentrations, QA is crucial – maintaining rigorous filter handling and low detection limit labs will keep the data meaningful. If any new industry with potential lead emissions opens in Kentucky, the state should be ready to deploy a source-oriented Pb monitor (for instance, a proposed battery recycling plant or ammunitions manufacturer would trigger this). In terms of broader metals monitoring, Kentucky could formalize a plan for periodically screening filters from different sites for toxic metals (this might already be happening as implied). For example, it would be beneficial to analyze a subset of $PM_{2.5}$ or PM_{10} filters for metals in industrial areas to track pollutants like manganese (near steel or alloy plants), hexavalent chromium (near plating operations), etc. This can be done through special studies or partnership with EPA's regional laboratory. Overall, no increase in routine lead monitors is necessary unless a new source appears, but maintaining analytical capability and vigilance is key. Finally, even though Louisville has no dedicated Pb monitor (since no source), the state could consider leveraging its metals analysis to include a site in Louisville occasionally for completeness. This would ensure that if any minor lead sources (like general aviation airports using leaded avgas) exist, their impact is not entirely unmonitored. In summary, **keep the two Pb sites active, and remain poised to adjust if industrial profiles change.**

Kentucky should sustain and potentially expand its air toxics monitoring efforts to ensure comprehensive coverage of hazardous pollutants. **For Louisville:** Continue the Rubbertown community monitoring and consider upgrading it into a more permanent neighborhood air toxics station, if resources allow. The success of reducing 1,3-butadiene in Louisville (due to industrial controls) was driven by having monitoring data; maintaining some level of HAP monitoring in that area will ensure levels remain in check. **For state-wide coverage**: Evaluate whether any city or region with significant industrial or traffic emissions might merit joining EPA's NATTS program or a state-equivalent toxics network. For example, a long-term toxics station in Ashland or Calvert City could serve as a trend site to track progress (post-study in Calvert City, perhaps a lighter sampling schedule could be continued). Partnering with EPA or universities for a pilot fenceline monitoring project at the Marathon refinery could also provide ongoing VOC data to the community. In the interim, Kentucky can leverage low-cost technologies: emerging passive samplers and small sensor systems for certain VOCs or benzene could be deployed near facilities on a rotating basis as a "survey." The plan already mentions exploring low-cost sensors and special projects – this should explicitly include sensors for HAPs, not just criteria pollutants. Data from any such sensors, while not FEM quality, can identify spikes or leaks that warrant more detailed follow-up.

In summary, **build on the PAMS and special studies platform**: keep PAMS VOC/carbonyl monitoring fully operational (including data reporting to EPA AQS as Louisville is now doing), reinstitute periodic toxics studies in known hotspots (perhaps every few years to check trends in Calvert City, Ashland, etc.), and consider establishing at least one permanent multi-HAP monitoring site outside Louisville to serve as a reference for rural/industrial air toxics levels in Kentucky. These steps will strengthen the network's ability to catch non-criteria pollutants that can affect health.

Continue the operation of the black carbon monitor at the Louisville near-road site, and ensure its data is utilized in assessing trends in diesel pollution and in public communications (e.g. Louisville can show community that diesel soot levels are being tracked). For PAHs, evaluate the current monitoring objectives: if the one PAH sampler is yielding data used in a risk assessment or compliance (some states have state PAH ambient standards), then maintain it. If not, perhaps repurpose it or relocate it periodically to gather data from different locations. For instance, one year focus on West Louisville, next year move PAH sampler to Ashland area, etc., to map PAH distribution. If feasible, using newer tech like a real-time PAH monitor (e.g. PAS or PUF sampler with shorter cycles) could provide better temporal resolution than integrated filters.

In the broader sense, Kentucky might incorporate these particulate toxics metrics into its **data reporting standards**: e.g., share annual summaries of black carbon and PAH levels in the network plan or websites, to highlight these non-regulated pollutant trends. Even though not required, this transparency builds public trust. Considering OSHA, PAHs and diesel particulate are occupational concerns (diesel exhaust is classified as a carcinogen), so by monitoring black carbon in ambient air, Kentucky is indirectly also addressing an occupational health interest for outdoor workers. If black carbon levels drop due to cleaner engines, both community and worker exposures benefit.

Keep meteorological stations well-maintained and calibrated (especially wind sensors, which are critical for back-trajectory and dispersion analysis). It's recommended to upgrade any older met equipment to "Air Quality Measurements approved" sensors as noted in the PAMS requirements – Louisville appears to have done so in 2021. Kentucky should ensure each regional office or primary monitoring region has at least one full meteorological station feeding data to both analysts and public archives. For low-cost sensors, the recommendation is to develop a formal framework for using them: for example, deploy sensor networks in communities as an educational tool, or as an early warning system in areas far from official monitors. Any data from such sensors should be vetted and clearly distinguished from regulatory data, but can help identify localized issues (like neighborhood wood smoke, traffic hot-spots, etc.). By the next network assessment, Kentucky could report on any findings from pilot low-cost sensor projects and consider if some might be integrated into public-facing air quality information systems (with appropriate caveats).

Furthermore, consider enhancing data reporting standards by including meteorological context with air quality alerts (e.g. mention when stagnant winds are causing pollutant build-up). Since the prompt asks about data reporting: Kentucky reports real-time data to

EPA AIRNow and their own websites; a recommendation is to also report comparisons to any applicable state standards or guidelines for non-criteria pollutants (like H_2S odor threshold or Air Toxics Reference concentrations) to give the public a fuller picture. For example, Louisville might report when the Algonquin H_2S levels approach the state's odor annoyance standard. This goes slightly beyond federal requirement but is good practice for community engagement.

The review did not find any gross violations or omissions in required monitoring; however, several areas for improvement were noted:

• **Industrial Coverage:** Although major industrial regions are mostly covered, a few could use better monitoring. Notably, Calvert City had only a temporary study for toxic VOCs – there is no permanent station continuously watching that area's emissions. The Ashland/Catlettsburg area might benefit from more routine toxics or particulate monitoring given the refinery and past industries. Similarly, after the Paducah DOE site ceased operations, no criteria pollutant monitors were stationed nearby (understandable since emissions dropped) but radiological monitoring is left to a separate program. The lack of a RadNet station in western KY means any radiological release in that region would rely on distant monitors in central KY. These are not regulatory requirements per se, but gaps in a holistic risk-based coverage.

• **Continuous Monitoring and Technology:** The network could modernize a bit further. For example, PM_{10} is still entirely manual except in Louisville; deploying continuous coarse PM monitors would improve data richness. Some smaller $PM_{2.5}$ sites still use intermittent FRMs – though supplemented by nearby continuous sites, eventually all areas might have real-time $PM_{2.5}$. Kentucky has only one NCore site (Louisville); while only one is required, a second multi-pollutant site in a different setting (e.g. a regional rural site or Lexington urban site) could strengthen data for nationwide programs. However, resource limitations may preclude that.

• **Air Toxics and PAH Monitoring:** Outside of PAMS, the hazardous air pollutant monitoring is limited and not continuous. Communities near certain industries may feel their pollutants of concern (air toxics, odors) are not fully captured by the permanent network, even though Kentucky addresses some via special projects. This can be viewed as a network deficiency in terms of community coverage, if not in federal metrics.

• **Data Reporting:** While Kentucky reports criteria pollutant data to EPA in a timely fashion (and had an honest discussion about delays in initial PAMS data reporting), there is always room to improve transparency. For instance, making all special study results public (the plan references an EPA site for the Calvert City study data) and integrating those findings into future network decisions is important. Also, ensuring the public can easily access real-time H_2S levels, VOC measurements, etc., perhaps via a state dashboard, would be beneficial. This is not a strict deficiency, but an area to enhance.

Based on the above analysis, the following detailed recommendations are offered to strengthen Kentucky's ambient monitoring network:

• **Enhance Monitoring near Key Industrial Facilities:** Consider establishing permanent or semi-permanent monitoring stations in the vicinity of large industrial complexes currently without year-round monitors. Specifically, a dedicated station in Calvert City could continuously measure VOCs (with passive samplers or a small auto-GC) and perhaps $PM_{2.5}$, to provide ongoing data to the community and regulators post-study. In the Ashland area, adding a toxics sampler (e.g. for benzene, toluene, etc.) at the Ashland Primary site or a nearby location in Catlettsburg would directly track refinery emissions impact. Even if run on a rotational basis (one year on, one year off), it would be an improvement. Kentucky should leverage EPA's Community-Scale Air Toxics grants or upcoming federal funding to support such monitors in key fenceline communities.

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• **Expand Near-road and Localized Monitoring:** Evaluate whether additional near-road monitoring is needed in a growing urban area like Lexington. If NO_2 and CO are indeed very low, a compromise could be to deploy a $PM_{2.5}$ and black carbon sensor near a busy road in Lexington to see if any notable gradient exists relative to the city's existing background site. This low-cost approach, if it finds elevated readings, could justify adding a formal near-road station in the future. In Louisville, beyond NO_2 and CO, consider if the I-264 near-road site should also measure ultrafine particles (UFP) or ammonia – not required, but some near-road sites do for research. Such data could inform health studies on traffic pollution.

• **Continuous Air Toxics Efforts:** Institutionalize some of the special studies. For instance, make the Calvert City VOC monitoring an every-5-year recurring project to track trends, or maintain a single canister sampler long-term with reduced frequency (e.g. one 24-hr sample a month) to keep a baseline dataset. Do likewise for other areas of concern (Rubbertown – though Louisville does this, perhaps share with state; and maybe one in the eastern KY oil/gas fields or urban Lexington for downtown toxics from vehicles). If resources allow, pursuing a dedicated NATTS site designation for Kentucky (for example, in Louisville or Paducah) would bring federal support and a consistent long-term toxics dataset.

• **Data Transparency and Reporting:** Improve the network's public data reporting by integrating all pollutants. Currently, citizens can readily find AQI for criteria pollutants, but not as easily the data for toxics like benzene or H_2S. Kentucky should consider publishing an annual "State of the Air Toxics" report or an online dashboard that includes summaries of VOC, carbonyl, PAH, and metal measurements, alongside the criteria pollutant statistics. This would align with recommendations in EPA's air monitoring assessment guidance to enhance stakeholder engagement. In doing so, use plain language to explain what the levels mean relative to health benchmarks (EPA risk levels, ATSDR reference concentrations, OSHA limits for context, etc.).

• **Prepare for Future Standards and Emerging Pollutants:** Keep an eye on EPA's ongoing reviews – for example, if the $PM_{2.5}$ annual NAAQS is tightened, Kentucky might need additional neighborhood-scale $PM_{2.5}$ monitors in urban areas to ensure compliance margins. Similarly, if climate change leads to more wildfire smoke impacts in Kentucky, the state might deploy temporary smoke monitors (as done out West) to affected areas. Formaldehyde and ethylene oxide are emerging concerns nationally; Kentucky could pre-emptively include these in lab analyses of air toxics samples to understand background levels. Essentially, build flexibility into the network to monitor new pollutants of concern (even PFAS in air near fire training areas, ammonia near large livestock operations, etc., could be future topics).

Response: APCD has reviewed the comments submitted on 5/21/25 by James Bowen and acknowledges the supportive comments for APCD's air monitoring network. No changes to APCD's monitoring network are being made in response to these comments.

Kentucky Ambient Air Monitoring Network Plan 2025

Introduction and Regulatory Framework

The 2025 Kentucky Annual Ambient Air Monitoring Network Plan opens with background on federal requirements for air monitoring networks. It correctly cites Section 319 of the Clean Air Act and EPA's 40 CFR Part 58 rules, which mandate uniform criteria for siting, methodology, and an annual network review. The plan includes all required station information (AQS site codes, locations, methods, operating schedules, proposed changes, etc.) as specified by 40 CFR 58. This demonstrates compliance with EPA's planning guidelines. OSHA standards, by contrast, apply to workplace indoor air and do not govern ambient (outdoor) monitoring – thus OSHA is not directly addressed in the plan. However, the plan's focus on public ambient air ensures that community exposures remain far below OSHA permissible exposure limits for pollutants like CO or SO_2, providing a margin of safety even for workers outside industrial facilities. Overall, the introductory section establishes a sound regulatory basis and scope for the network.

Recommendation: Continue to clearly link the network design to federal requirements (e.g. NAAQS compliance, 40 CFR Part 58). Consider adding a brief statement distinguishing EPA ambient standard from OSHA workplace standards, to clarify the plan's public health focus. Ensure future plans maintain comprehensive station data per 40 CFR 58.10 and highlight any regulatory changes (such as new EPA monitoring rules) that may affect network requirements.

Station Description Format and Site Criteria

This section outlines how each monitoring station's description is formatted, including site designations (SLAMS, NCore, SPM), parameters measured, monitor types, and site selection rationale. Kentucky's plan provides definitions for monitor categories and pollutants (e.g. SLAMS, SPM, NCore, PAMS, etc.) and discusses siting scales (micro, neighborhood, urban, regional) consistent with EPA's Appendix D criteria. The plan states that all monitors used for NAAQS compliance employ Federal Reference or Equivalent Methods (FRM/FEM) and follow EPA's quality assurance requirements. This indicates methodological adequacy – the network uses approved instruments and QA/QC procedures, as required. Each station narrative includes the monitoring objective and spatial scale, ensuring the site's purpose (e.g. population exposure, maximum concentration, background) is documented in line with EPA guidance.

One finding is that two monitoring sites (Hazard and Somerset) do not fully meet EPA siting criteria for distance from roadways, due to their proximity to lightly traveled park roads. The plan openly identifies these issues and includes EPA-approved waivers for the distance criteria in Appendix K. For example, at Hazard the $PM_{2.5}$ sampler inlet is ~11.8 m from a park road versus the 15 m minimum for a neighborhood-scale site, but EPA granted a waiver given the road's negligible traffic. Similarly, the Somerset site's $PM_{2.5}$ inlet is ~10 m from a dead-end street (vs

15 m required), which was waived since the street acts more like a driveway with minimal traffic. These waivers suggest the network is generally compliant with siting rules, aside from minor exceptions justified by local circumstances.

Recommendation: Maintain thorough documentation of site compliance with 40 CFR Part 58 Appendix E (siting criteria) and proactively seek EPA waivers where criteria cannot be met due to geographic constraints. It is recommended to periodically evaluate whether such sites can be improved or relocated; for example, if the Hazard or Somerset sites remain in use long-term, explore modest relocations on the property to fully meet siting distances once emergency use of adjacent areas ends. Continue to use the standardized station description format and consider adding a quick-reference table of each site's key designations (scale, objective, EPA site type) to facilitate review of network adequacy against EPA's siting requirements.

Network Summary and Overall Coverage

The network summary (2025 Air Monitoring Stations Summary) provides an overview of Kentucky's ambient monitoring network size and coverage. KDAQ (state) operates 24 sites across 23 counties with 68 instruments, and Louisville Metro Air Pollution Control District (LMAPCD) operates 5 sites in Jefferson County with 34 instruments; an additional site is run by the National Park Service at Mammoth Cave. In total, the Commonwealth's network comprises 30 monitoring sites with 103 instruments (including 7 meteorological stations) spread across 25 counties. The summary table indicates the number of monitors by pollutant and region, confirming that all six criteria pollutants ($PM_{2.5}$, PM_{10}, O_3, NO_2, SO_2, Pb) are monitored, along with various air toxics and meteorological parameters. Notably, Kentucky proposes **no network reductions** for 2025; the state is maintaining all existing monitors, and any changes in Louisville's network are detailed separately in Appendix E. This stability suggests the current infrastructure is deemed sufficient by the agencies.

Adequacy relative to EPA minimum requirements: The network appears to meet or exceed EPA's minimum monitoring requirements for each pollutant, based on population and air quality levels. For example, the Louisville/Jefferson County MSA (population ≈1.3 million) operates 6 ozone monitors including a downwind "maximum ozone" site, exceeding EPA's minimum requirement of 3–4 ozone sites for an area of its size/design value. Similarly, the Cincinnati-Northern KY MSA shares monitoring responsibilities via a multi-state agreement; Kentucky and Ohio together provide the required coverage (e.g. at least 3 $PM_{2.5}$ monitors and 2 ozone monitors for the ~2.1 million population). The plan explicitly notes updated Memoranda of Agreement with neighboring states to coordinate monitoring in interstate regions (e.g. the Cincinnati OH-KY-IN MSA and the Clarksville TN-KY MSA). This coordination ensures that multi-state urban areas have the collectively required number of monitors without duplication.

Geographically, the network provides broad coverage of Kentucky's urban and industrial areas. All larger MSAs (Louisville, Lexington, Northern Kentucky/Cincinnati, Owensboro, Paducah, Huntington-Ashland, Bowling Green) have at least one monitoring site, and most have multiple monitors tracking different pollutants. Rural and regional background conditions are also captured (e.g. Mammoth Cave NPS ozone, Pennyroyal Forest $PM_{2.5}$ transport site, and other "X" designated regional/background $PM_{2.5}$ sites). This mix of urban population-oriented sites and regional sites aligns with EPA's network design objectives to characterize both high population exposure and regional transport. The inclusion of meteorological measurements at seven sites is another strength, aiding interpretation of pollution events.

Coverage of major emissions sources: Most known major air pollution sources in Kentucky are reasonably covered by nearby ambient monitors, though some gaps exist. In the Louisville area, the Rubbertown industrial complex and power plants are in Jefferson County, which has a dense monitoring network. Louisville's network includes neighborhood sites in the western corridor (e.g. Chickasaw, Cannons Lane NCore, and Algonquin Parkway) that track emissions impacts

from Rubbertown chemical plants and the Mill Creek power station. A special-purpose H_2S monitor at the Algonquin Parkway site further addresses community odor and sulfur risks near industry. In Northern Kentucky, the network relies on an interstate approach: large sources (e.g. the Zimmer and Miami Fort power stations across the river, or traffic on the I-75 corridor) are accounted for by the Cincinnati-area monitors operated by Ohio, supplemented by Kentucky's $PM_{2.5}$ and ozone sites in Campbell and Boone counties. The Huntington-Ashland industrial region (Marathon's Catlettsburg refinery, AK Steel coke operations) is now monitored by the new "Ashland Primary" site in Greenup County, which measures SO_2 and O_3. This site is close enough to capture ambient concentrations from the refinery's vicinity, though it may not be immediately downwind of the highest refinery fenceline impacts at all times. In western Kentucky, the Plan indicates a special one-year study was conducted near the Calvert City chemical industrial complex to monitor VOC toxins (like vinyl chloride and ethylene dichloride) and assess risks. That study involved a dedicated VOC monitoring site at Calvert City Elementary in 2020–2021. The study's results (referenced in Appendix G) presumably informed whether a permanent monitor was needed. While that special-purpose project has concluded, it reflects the state's awareness of Calvert City's emission hazards.

One notable gap is the absence of a permanent state-run monitor in the immediate vicinity of the Paducah Gaseous Diffusion Plant (PGDP) in McCracken County – a facility with potential radioactive and chemical emissions legacy. The ambient network does include a general-population site in Paducah's MSA and an EPA "RadNet" radiation monitor in central Kentucky (Lexington), but no routine station is located right at Paducah or other nuclear-related sites. However, it should be noted that Kentucky addresses PGDP emissions through a separate DOE-funded oversight program, which conducts independent environmental monitoring around the plant. This means that while the DAQ ambient network doesn't specifically sample at PGDP, another branch of the state is tracking radiation and hazardous pollutants near that site. From a network adequacy perspective, communities near large single sources (e.g. power plants, smelters) are generally covered either by monitors or by technical analyses. Kentucky complied with EPA's SO_2 Data Requirements Rule by characterizing areas around major SO_2 emitters: for example, a dedicated SO_2 monitor in Henderson County (with "DRR" designation) was deployed to assess the impact of a coal-fired power plant there. Other big SO_2 sources (such as the Trimble County and Ghent power stations, or the Century aluminum smelter in Hancock County) were addressed via modeling or nearby $PM_{2.5}$ monitors that also capture sulfate impacts. The Hancock County site in the network (1 monitor reporting AQI) likely serves to monitor particulate and any lead/metals downwind of the smelter.

Overall, the network summary indicates Kentucky has a robust coverage for both urban air quality and industrial hotspots. The **only significant coverage gaps** identified are the lack of permanent, routine air toxics monitoring in certain industrial communities (e.g. Calvert City now that the special study ended, and perhaps the Ashland refinery area beyond criteria pollutants). Additionally, some smaller cities or rural counties with specific pollution sources rely on

modeling rather than monitors (which is acceptable by EPA rules but provides less direct public data).

Recommendation: No major expansions to criteria pollutant coverage are federally required at this time, but a few improvements are advisable. First, consider establishing *permanent* air toxics monitoring (or recurring special studies) in communities near major chemical or petrochemical facilities (e.g. Calvert City, Catlettsburg) to supplement the one-time studies. Even low-cost sensor networks or periodic canister sampling could help track volatile organic compounds in these areas over time. Second, where modeling was used in lieu of SO_2 or NO_2 monitors around large point sources, periodically evaluate if model assumptions remain valid – if industrial operations change significantly, a temporary monitor could verify actual concentrations. Third, continue close coordination with neighboring states through MOAs to ensure interstate air basins (e.g. Cincinnati, Huntington-Ashland) retain sufficient monitors; jointly review if any new near-source issues (like increased riverport traffic or new industrial projects) warrant additional stations on either side of state lines. Lastly, although the RadNet radiation monitors are outside DAQ's network, Kentucky could work with EPA to site an additional RadNet station in the western part of the state for more direct coverage of the PGDP vicinity or the Louisville region. This would enhance early detection of any radiological releases and improve spatial coverage of that federal network.

Criteria Pollutant Monitoring Networks

$PM_{2.5}$ (Fine Particulate Matter) Monitoring

Network Extent: Kentucky's $PM_{2.5}$ network is comprehensive, with a total of 25 $PM_{2.5}$ monitors (5 filter-based FRM samplers and 20 continuous FEM analyzers) statewide. At least one $PM_{2.5}$ monitor (usually continuous) is present in every metropolitan area and several rural locations, fulfilling EPA's minimum requirements in 40 CFR Part 58 Appendix D, Table D-5. For instance, the Louisville MSA operates multiple $PM_{2.5}$ monitors (at least 5, of which 2 are FRM filter samplers and 3+ are continuous FEM) to cover area-wide exposure and high concentration areas. Lexington, Northern Kentucky, Owensboro, Ashland, Paducah, and other areas each have one or more $PM_{2.5}$ monitors as required by their population and air quality levels. The network also includes regional/background $PM_{2.5}$ sites (noted with "X" in the summary) such as the Pennyrile Forest site and others, which track transported particulate pollution in non-urban settings. This mix of sites meets the EPA design criteria of capturing both population exposure (neighborhood/urban scale monitors in cities) and regional transport (regional scale sites).

Methodology and Frequency: The state has heavily invested in continuous $PM_{2.5}$ monitoring technology. According to the plan, **most $PM_{2.5}$ monitors have been converted to continuous FEM instruments (e.g. Teledyne T640 or BAM)**, with only three filter-based FRM samplers remaining in operation. The FRM samplers are typically run on every-3-day or every-6-day schedules for gravimetric mass determinations, whereas the FEM units provide hourly readings. By using FEM continuous analyzers at nearly all sites, Kentucky ensures real-time $PM_{2.5}$ data is available for Air Quality Index reporting and public alerts, which is especially important since the EPA requires daily AQI reporting in all areas >350,000 population. Indeed, the summary table flags "AQI reported (i)" next to virtually every $PM_{2.5}$ monitor, indicating each area's continuous monitor is used for daily public reporting. The network also complies with EPA's requirement to collocate at least one continuous analyzer with an FRM in each area – in Louisville, for example, an FEM is collocated with an FRM at the Cannons Lane NCore site, and other MSAs likely have a similar pairing. All $PM_{2.5}$ methods are EPA-designated; the plan confirms that samples are collected per 40 CFR Part 50 Appendix L for manual samplers and that all analyzers are FRM/FEM with proper QA audits.

Spatial Adequacy: The $PM_{2.5}$ monitors are well-sited to represent both neighborhood-scale exposure in populated areas and maximum impacted locations. For example, in Louisville, one monitor is specifically identified as the maximum $PM_{2.5}$ concentration site (likely in an industrial or high-traffic area), while others represent broader urban background. In rural eastern Kentucky (e.g. Hazard/Perry County and Pikeville), $PM_{2.5}$ monitors are sited to capture coal-burning and regional haze impacts in those communities. The network design seems to consider topography and wind patterns; however, coverage could be more robust near certain large industrial PM sources. One potential gap is the **lack of continuous $PM_{2.5}$ monitors immediately downwind of the Calvert City industrial cluster** (the nearest permanent $PM_{2.5}$ site might be in Paducah,

which is somewhat removed). The 2020–21 special study in Calvert City did include 24-hr integrated VOC sampling but did not mention continuous $PM_{2.5}$, so ongoing fine particle levels in that micropolitan industrial zone rely on the Paducah-area monitors. Given that facility emissions (e.g. from chemical production or power generation) can contribute to fine particulate (secondary formation), a more permanent $PM_{2.5}$ presence in that vicinity could be beneficial.

Regulatory Compliance: Kentucky's $PM_{2.5}$ network meets current federal mandates. All large MSAs have at least the required minimum number of monitors (in fact, Kentucky often operates more than the bare minimum, providing a buffer of extra data). The state has also satisfied the requirement for a continuous $PM_{2.5}$ monitor in each area for AQI purposes. There is currently no EPA requirement for near-road $PM_{2.5}$ monitoring except in extremely large cities (CBSA >2.5 million), which does not apply in Kentucky. Nevertheless, Louisville's near-road site *does* include a $PM_{2.5}$ FEM (with black carbon co-measured), demonstrating Kentucky's proactive approach to characterize roadway particulate emissions. This exceeds federal minimum requirements and provides valuable data on localized PM hot spots from traffic.

Recommendation: The $PM_{2.5}$ network is generally strong. It is recommended to maintain the existing FRM samplers for data continuity and QA (e.g. for use in comparisons and possible designation purposes), while continuing to leverage continuous FEM data for public reporting and health forecasting. Kentucky should consider expanding $PM_{2.5}$ monitoring in any growing communities or industrial areas currently with marginal coverage – for example, adding a permanent continuous $PM_{2.5}$ monitor closer to the Calvert City complex if future risk assessments warrant it. Additionally, as older FRM units age, the Division should plan for their replacement or upgrade (possibly with FEM units that can operate in a filter-sampling mode if needed for collocation). Finally, ensure all continuous monitors remain properly correlated to FRM methods (e.g. via annual collocated sampling or calibration checks) so that data remains NAAQS-comparable. By continuing to modernize instruments and filling small spatial gaps, Kentucky can keep its $PM_{2.5}$ network aligned with best practices and ready for any future tightening of standards.

PM_{10} (Coarse Particulate Matter) Monitoring

Network Extent: Kentucky operates relatively few PM_{10} monitors, reflecting the nationwide trend as PM_{10} levels have generally been in compliance. According to the summary, the state network has 5 PM_{10} monitors (all filter-based manual samplers) and Louisville adds 2 continuous PM_{10} (or PM_{10}-coarse) instruments. The PM_{10} samplers are likely located in areas prone to coarse dust or where industrial sources might elevate coarse particulate (for example, one might expect PM_{10} samplers near quarries, major construction projects, or in the vicinity of mineral processing industries if any). The presence of a footnote "m" (PM_{10} filter analyzed for metals) in the summary suggests at least one PM_{10} sampler is used to collect TSP or PM_{10} samples for lead/metals analysis. This likely fulfills the EPA requirement for lead monitoring (either at an NCore site or source-oriented, see lead section below). Louisville's two continuous PM_{10}

monitors (noted with footnote "E" for T640x coarse) mean Jefferson County can measure real-time coarse fraction data at key sites. No state-operated continuous PM_{10} analyzers are listed (KDAQ shows 0 in that column), so outside Jefferson County, PM_{10} data is obtained via 1-in-6 day or 1-in-3 day manual samples.

Adequacy and Gaps: EPA's Appendix D requires at least 1 PM_{10} monitor in any urban area >100,000 population, and in smaller cities only if there are significant sources of coarse dust. Kentucky's network meets these criteria – e.g. Louisville, Lexington, and other MSAs have PM_{10} coverage (the table indicates PM_{10} monitors in Lexington-Fayette and possibly Owensboro and Ashland MSAs). The distribution seems to cover western Kentucky as well, since the Paducah MSA has a PM_{10} sampler (Paducah row shows "1" in the PM_{10} column). One site in the "Not in a CBSA" category – likely Hancock County – might also be running a PM_{10} or TSP sampler for source-specific monitoring (given the presence of an aluminum smelter there, this could be for lead or fluoride particulate). Overall, the PM_{10} network is minimal but targeted: it likely monitors areas where coarse particles might approach the 24-hour PM_{10} NAAQS (150 $\mu g/m^3$). Since Kentucky has no PM_{10} nonattainment and generally moderate PM_{10} levels, this focused approach is acceptable.

However, one deficiency is the **lack of continuous PM_{10} monitoring by KDAQ**. While continuous coarse particle monitors are not federally mandated, they can be useful for public information during dust events (e.g. summertime dust storms from agriculture or winter road sanding). Louisville's use of T640x units (which measure $PM_{2.5}$, PM_{10}, and coarse fraction concurrently) is a forward-looking practice. The state might eventually adopt similar technology at key sites to replace pure PM_{10} filter samplers. Another gap could be the coverage near certain heavy industries: for example, blasting or surface mining areas in eastern Kentucky could generate localized PM_{10} that isn't captured if no monitor is nearby. The network has a Pike County (Pikeville) site with both $PM_{2.5}$ and likely PM_{10} monitoring, which is appropriate given mining activity in that region. As long as complaint investigations and periodic reviews don't indicate high unexplained PM_{10} elsewhere, the current network is probably sufficient for NAAQS surveillance.

Recommendation: Continue operating the existing PM_{10} sites to maintain long-term data records, especially if any are used for lead/metals analysis or background reference. The state should evaluate upgrading one or two manual PM_{10} stations to continuous "dual-channel" monitors (like the Teledyne T640X or BAM PM_{10}) in the future. Priority for such an upgrade could be given to a site in an area with potential for rapidly changing coarse dust levels (for example, in Owensboro or Paducah if industrial dust or agricultural burns are concerns). This would improve real-time awareness of dust events and allow AQI reporting for PM_{10} if needed. Additionally, keep an eye on areas with new construction, mining, or demolition activities – deploying temporary PM_{10} sensors or portable monitors in those areas could preempt any NAAQS issues. Overall, the PM_{10} network meets federal requirements, but incremental modernization (moving away from purely intermittent sampling) is recommended.

Ozone (O_3) Monitoring and PAMS

Network Extent: Ozone is well-monitored across Kentucky. The plan shows a total of 26 ozone monitors statewide (21 operated by KDAQ, 4 by Louisville APCD, and 1 by NPS at Mammoth Cave). Every metropolitan region has at least one O_3 monitor; Louisville has several (6), Lexington has 2, Northern Kentucky/Cincinnati area has monitors on both sides of the river, and smaller cities like Owensboro, Bowling Green, Ashland, and Paducah all have coverage. Additionally, rural ozone transport is tracked at Mammoth Cave National Park (a regional background site) and likely at other strategic locations (e.g. the Pennyroyal Forest and Eden Ridge sites listed as upwind or regional). This network not only meets the minimum required number of ozone monitors per MSA (as per 40 CFR Part 58 Appendix D, which specifies 2–3 ozone sites for most Kentucky MSAs based on population and historical values), but in many cases exceeds it to ensure both peak ozone and general exposure are captured. For example, Louisville's 6 sites include a designated maximum ozone site (footnote "Max"), typically placed downwind of the urban center to record the highest concentrations, as well as urban core sites for population exposure. This aligns with EPA's requirement to monitor at locations of expected maximum O_3 (often suburban downwind) and in areas of high population exposure.

Season and Frequency: Kentucky operates ozone monitors during the ozone season (March 1–Oct 31) in compliance with federal scheduling (some NCore or PAMS sites may run year-round). The plan doesn't explicitly state the operating season for each, but historically Kentucky's climate allows seasonal operation except at NCore where year-round is encouraged. Data from all ozone sites are reported in near-real-time (for AQI and AirNow), which is important since ozone has acute health impacts. The network also participates in EPA's Photochemical Assessment Monitoring Station (PAMS) program: per EPA mandate, Kentucky began PAMS measurements by June 2021 at its NCore site. In the Louisville APCD section, it's noted that PAMS requirements (additional ozone precursor monitoring) were implemented at the Cannons Lane NCore site starting in 2021, albeit with initial delays due to equipment and staffing issues. By 2022–2023, Louisville was successfully collecting and reporting PAMS data (e.g. carbonyl samples and automated VOC GC data) to AQS. This shows Kentucky is meeting the newer federal requirements for enhanced ozone precursor monitoring in areas that need it.

Spatial Coverage and Industrial Considerations: Ozone is a regional pollutant, so coverage is assessed on a wider scale. Kentucky's monitors are spaced such that they capture ozone formation downwind of every urban area and the general background entering and leaving the state. For instance, Northern Kentucky's ozone monitor (e.g. at Covington or Campbell Co.) picks up both local urban ozone and transport from Cincinnati. The Ashland-area ozone monitor in Greenup Co. is likely upwind or downwind of the Catlettsburg refinery, providing data on industrial NOx/VOC contributions to ozone. One possible gap in ozone monitoring might be the extreme southeastern mountain region – the plan has a monitor in Pike County (likely at Pikeville) and one in Perry County (Hazard). These cover a good portion of the region, though there are high elevations in southeast KY that sometimes experience significant ozone (e.g. near

the Great Smoky Mountains, but Kentucky's slice is small). The Middlesboro monitor (Bell County) addresses this by measuring ozone in the Cumberland Gap area. Therefore, even the mountain-valley areas have representation.

It's worth noting that Kentucky does not currently have any areas classified as severe ozone nonattainment; most areas are in attainment or marginal nonattainment at worst. The network appears sufficient to support ozone NAAQS compliance demonstration and public health alerts. Louisville and perhaps Northern Kentucky have had occasional ozone exceedances; the monitors in those areas are appropriately sited to capture the peaks and have data for regulatory design values.

PAMS and Ozone Precursors: The Photochemical Assessment Monitoring Station program in Louisville adds a suite of additional measurements during summer ozone season: hourly speciated VOC measurements via auto-GC, carbonyl sampling every 3 days, and meteorological parameters like surface and aloft (mixing height via ceilometer) data. The plan's Appendix for Louisville indicates that despite initial challenges, APCD is now reporting valid PAMS data to EPA's database. This is a critical enhancement because it helps diagnose ozone formation and ensures Kentucky meets the federal mandate (40 CFR Part 58 Appendix D Section 5) for PAMS in ozone areas of interest. No other city in Kentucky is required to run PAMS (only one PAMS site per state is mandated, at the NCore in the area with >1M population and significant ozone issues). The state does not list additional precursor monitors elsewhere, though some VOC sampling was done at Calvert City as discussed.

Recommendation: The ozone network is robust and well-aligned with EPA requirements. It is recommended to continue operating all current ozone monitors given their value for both NAAQS compliance and regional air quality mapping. No sites appear redundant; in fact, each often serves a unique directional coverage (urban center vs. downwind suburb vs. regional background). Kentucky should maintain the "maximum ozone" site designations and ensure those sites have the proper trace-level instrumentation and calibration (peak ozone sites can experience high values that need accurate capture). For the PAMS program, Louisville should work to fully optimize the automated VOC gas chromatograph and meteorological profiler to maximize data capture each ozone season. The plan already notes improvements in reporting; continued training and staffing support for PAMS will be important, as these enhanced measurements are complex. If any additional resources are available, Kentucky could consider deploying portable ozone monitors or additional PAMS sensors during episodic events or studies (for instance, a short-term deployment in the Paducah region during high-ozone days to see transport from upwind states). This isn't a requirement, but it could help verify that no uncovered area is experiencing unreported high ozone. Lastly, as EPA is reconsidering the ozone NAAQS, the state should be prepared for potential lowering of the standard – which might necessitate even greater spatial resolution of ozone monitoring. Proactively evaluating areas just meeting the current standard (like parts of central KY) for any needed additional monitors would put Kentucky ahead of the curve.

Nitrogen Dioxide (NO_2/NO_x) Monitoring

Network Design: Kentucky's NO_2 monitoring network consists of 7 NO_2 monitors (5 state-operated, 2 in Louisville) and 1 NO_y analyzer (at the NCore site). NO_2 is measured at key urban sites, largely to satisfy EPA's focus on near-road monitoring and background tracking for this pollutant. The plan shows that Louisville operates a **near-road NO_2 site** (Durrett Lane near I-264) as required for any CBSA >1,000,000 population. This site is designated with an "n" (near-road) in the summary, and it also includes black carbon monitoring to better characterize traffic emissions. The near-road NO_2 monitor addresses the EPA mandate (40 CFR Part 58 Appendix D 4.3.2) that cities like Louisville have a microscale site near a busy highway to capture peak 1-hour NO_2. For the Cincinnati multi-state area (>2 million), Ohio operates a near-road NO_2 site in Cincinnati, which counts toward Kentucky's obligation via the interstate agreement. Lexington, with a population around 500,000, is *not* required to have a near-road NO_2 monitor under current rules (the initial 2010 rule requiring one for >500k was revised, and now only areas ≥1 million must have one). Accordingly, Lexington has no near-road station, but it does have one NO_2 monitor at a general urban site (the plan's Lexington "Primary" site at Newtown Pike likely includes NO_2 and NOy as part of the NCore-like measurements). Smaller cities in Kentucky do not have NO_2 monitors, which is consistent with EPA guidance that NO_2 SLAMS are primarily needed in large urban areas or near large point sources (there are no significant point sources of NO_2 akin to how power plants are for SO_2 – NO_2 is mostly from vehicles and urban combustion).

Adequacy: The NO_2 network meets the federal design criteria. Louisville has both the required near-road site and an area-wide site (Cannons Lane NCore) for broader urban NO_2 concentrations. EPA's design calls for at least one area-wide NO_2 monitor in each city >1 million in addition to the near-road site, and Louisville's NCore fulfills that by measuring NO_2/NOy at neighborhood scale for population exposure. Data from these sites indicate that ambient NO_2 in Louisville is below the NAAQS, though near-road levels are higher in the 1-hr peaks – exactly the reason the monitor is there. In the Cincinnati/Northern KY area, Kentucky relies on Ohio's monitors (Cincinnati near-road and a downtown site) to gauge NO_2; given the proximity of these urban areas, that coverage is likely sufficient for northern Kentucky's population (and formalized by MOA). For background and regional NOx, the state operates an NOy analyzer (which measures total oxidized nitrogen) at the Louisville NCore station. This NOy is important for regional pollution and ozone modeling and is a required parameter at NCore sites.

Gaps and Potential Issues: One area to watch is the **Lexington metro**. With no dedicated NO_2 monitor in Lexington, there is a slight data gap for urban NO_2 in the state's second-largest city. While not federally mandated, Lexington's traffic has grown, and localized NO_2 hotspots (e.g. near major freeway interchanges) are possible. The state may be assuming that Lexington's ozone monitors and emission inventories suffice to show NO_2 is well below standards (which is likely true, as NO_2 problems are generally only in very large cities). Nonetheless, from a thoroughness perspective, Lexington could benefit from at least a periodic study or passive NO_2 monitoring near its busiest roads to verify that no unmonitored hotspot exists. Another gap is in

industrial NO_2 – large power plants emit NOx which could theoretically cause high ground-level NO_2 nearby. However, experience shows those typically contribute more to regional ozone/PM formation than to violating NO_2 standards at ground-level. The state did not indicate any NO_2 monitors at power plant fencelines (none are required because modeling has demonstrated compliance for the NO_2 1-hr NAAQS in those areas, and NO_2 NAAQS is relatively high compared to ambient levels).

Recommendation: The current NO_2 monitoring network is compliant and generally adequate. It is strongly recommended to **continue operating the Louisville near-road NO_2 site** (Durrett Lane) as it provides critical data on worst-case NO_2 from traffic for both NAAQS compliance and public health information. Louisville should also maintain the trace-level NO_2/NOy at the NCore site for understanding urban background and regional transport of nitrogen oxides. For Lexington and other mid-size cities, Kentucky should consider deploying a short-term near-road NO_2 monitor or passive samplers to ensure those areas truly have ample margin below the NAAQS. Even if not permanent, a one-year study near Lexington's busiest highway (I-75/I-64 corridor) would provide valuable confirmation that no monitoring is needed there – essentially a data-backed waiver. Additionally, as vehicle fleets get cleaner, Kentucky might coordinate with EPA Region 4 to possibly **request a waiver or discontinuation** of certain NO_2 sites in the future if data trends are consistently very low (EPA has in recent years allowed some near-road NO_2 sites to shut down in cleaner areas). Any such decision should be made with multi-year data and EPA approval. For now, no network reduction is advised, but Kentucky can start evaluating long-term NO_2 data to optimize the network by the next 5-year assessment. Finally, continue to report NO_2 data to the public (e.g. via AIRNow) even if AQI levels are "Good" – this transparency helps validate the success of pollution controls in Kentucky's cities.

Sulfur Dioxide (SO_2) Monitoring

Network Design: The plan indicates 11 SO_2 monitors in the state (8 by KDAQ, 3 by LMAPCD). These are strategically placed near current or former SO_2 emissions hotspots and population centers. Louisville's three SO_2 monitors likely cover industrial areas (e.g. one near the Mill Creek power plant or Rubbertown, one at the NCore for urban background, etc.). State-operated SO_2 monitors are deployed in areas with major sources: for example, Greenup County (Ashland Primary site) measures SO_2 in the Huntington-Ashland industrial region; Henderson County has a SO_2 monitor specifically marked as "DRR" (Data Requirements Rule) to assess the SO_2 from the coal-fired power plants in that area. It is likely there is an SO_2 monitor in Daviess or Hancock County, given large sources historically present (the summary suggests Hancock County's site might not measure SO_2, as no "DRR" is noted there – possibly because the aluminum smelter's power plant was addressed by modeling instead). Additionally, the network summary shows an SO_2 monitor in the Paducah MSA ("1" under SO_2 for Paducah's row), possibly to track the TVA Shawnee power plant's influence. The SO_2 Data Requirements Rule (DRR) from 2015 compelled states to characterize 1-hr SO_2 around any source emitting >2,000 tpy SO_2. Kentucky complied by a combination of modeling and monitoring. The presence of the Henderson SO_2

DRR monitor and perhaps others indicates Kentucky installed monitors for some high-risk areas while modeling others. Notably, the plan does not list SO_2 monitors in every county with a power plant – e.g., there is no explicit mention of monitors near Trimble County or Mason County (Spurlock Station), suggesting those were handled via modeling or the sources have reduced emissions.

Adequacy: The current SO_2 network covers the major populated areas that could be impacted by SO_2. Louisville and Northern Kentucky (downwind of large Ohio Valley coal plants) have monitors to ensure urban SO_2 remains in check. The Ashland area monitor covers the refinery and steel mill emissions zone. Monitors in Campbell/Boone County (as part of the Cincinnati MSA) likely double as SO_2 background for Northern KY and could catch any Ohio River valley plume. One potential gap might be in the western Kentucky coal plant cluster: Paradise Fossil Plant in Muhlenberg County was historically huge SO_2 emitter, but it was retired in 2020 (so the need for a monitor disappeared). If any large units remain (e.g. at the TVA Shawnee plant near Paducah or Big Rivers' Wilson station near Centertown), and if not directly monitored, the state relied on modeling to show attainment. Given that Kentucky has **no SO_2 nonattainment areas** currently (all areas are meeting the 1-hr SO_2 standard), the combination of monitors and modeling appears to be working. Another point: some of Kentucky's SO_2 monitors might be operating under waivers for reduced frequency now that concentrations are low (EPA allows shutdown or less-than-continuous operation if well below standard, but Kentucky seems to be keeping them running continuously for now).

Instrument Compliance: The plan doesn't detail instrument types, but likely uses UV fluorescence analyzers for SO_2 (the standard FEM method). These instruments can reliably detect the low concentrations now typical in ambient air (<10 ppb). QA procedures (calibrations with certified gas standards) are followed.

Recommendation: The SO_2 monitoring network should be maintained at least at its current scope until the EPA and state are confident all major sources' impacts are accounted for via permanent emissions reductions. Kentucky should continue operating the Henderson DRR monitor as long as the associated source (the power station) is active, to provide assurance of ongoing attainment. If any modeled source area in Kentucky is near the 1-hr SO_2 standard, the state should consider adding a monitor or enhanced SO_2 tracking there to verify model predictions. For example, if the Big Rivers-Deer Run (formerly D.B. Wilson) station in Ohio County or the Ghent plant in Carroll County still emit significant SO_2 but were handled by modeling, a periodic field study or SO_2 sensor could be prudent to validate no hotspots exist. Conversely, if some SO_2 monitors have shown years of very low values (e.g. Louisville's urban SO_2 might be consistently low after coal unit retirements), the state could evaluate whether all are still needed or if some could be moved to new locations of interest. Any network optimization should be done in consultation with EPA. Lastly, the state should keep up with EPA's SO_2 NAAQS review – if the standard becomes more stringent, previously "safe" areas might need renewed attention. In summary, the current network meets requirements and is well-

targeted; ongoing vigilance and minor adjustments in response to the evolving energy landscape (coal plant closures vs. any new combustion sources) are recommended.

Carbon Monoxide (CO) Monitoring

Network Extent: Carbon Monoxide monitoring has been significantly scaled back nationwide due to sustained low ambient levels. Kentucky's network has only 2 CO monitors, both in Louisville (one at the NCore site and one at the near-road site). The plan's summary shows "2 CO" for LMAPCD and 0 for KDAQ, meaning no state-operated CO monitors outside Jefferson County. This aligns with current federal policy – the minimum requirement is typically one CO monitor at each NCore station (trace-level CO) and optionally at near-road sites, especially those that already have NO_2 (EPA encouraged co-monitoring CO at near-road sites to track traffic-related pollutants). Louisville's near-road station indeed includes a CO analyzer, as Ohio's network description corroborates that each near-road site in the region has a CO monitor alongside NO_2. The Louisville NCore (Cannons Lane) also has a low-range CO monitor as part of its multi-pollutant suite.

Adequacy: This limited CO network is adequate given the extremely low ambient CO concentrations relative to standards. The 8-hour CO NAAQS is 9 ppm; typical urban CO in Louisville is well under 2 ppm even near roads, thanks to vehicle emissions improvements. No other Kentucky city has the traffic density that historically caused high CO (e.g. in the 1970s). Therefore, not having CO monitors in Lexington or other cities is reasonable and consistent with EPA's removal of most CO monitoring requirements for areas in compliance. The Louisville monitors cover the worst-case location (near freeway) and provide background data. Additionally, CO is a "quick look" indicator for combustion – the NCore CO data help with model evaluations and air quality index, although CO rarely if ever drives the AQI now.

OSHA perspective: It's worth noting that even near busy roads, outdoor CO in Kentucky is far below occupational limits (OSHA's PEL for CO is 50 ppm over 8 hours – an order of magnitude higher than any ambient levels). Thus, ambient CO monitoring is more about tracking trends and supporting AQI forecasts than about finding health standard exceedances. Kentucky's current approach reflects that reality.

Recommendation: Continue operating the Louisville CO monitors for long-term trend data and as part of the NCore and near-road pollutant suite. These instruments also serve as a form of "insurance" in case of unusual events (for instance, a downtown traffic jam under inversion or a local emergency involving fire – CO monitors could detect any acute spikes). For the rest of the state, dedicated CO monitors are not necessary unless a specific localized concern arises (e.g. if a city hosts an event that traps lots of vehicles in tunnels or parking garages – then temporary CO monitoring might be warranted). The state should periodically review traffic and emission data; if, in the future, Lexington's downtown were to develop features that might elevate CO (like more high-rises creating street canyons), they might revisit adding a CO sampler, but currently that's not indicated. In summary, the CO monitoring is slim but sufficient. The recommendation

is mostly to **maintain the status quo**, calibrate and QA/QC the existing CO analyzers diligently (trace CO instruments can drift at low levels), and use the data for model validation and public information. Should any CO monitor show readings approaching even half the NAAQS (which is unlikely), that would prompt investigation and possibly re-introduction of more CO monitoring; otherwise, Kentucky can focus resources on pollutants of more concern.

Lead (Pb) and Metals Monitoring

Network Design: The plan shows 2 lead (Pb) monitoring sites in Kentucky. These likely correspond to: (1) the required lead monitor at the state's NCore station, and (2) a source-oriented monitor near any facility emitting ≥0.5 tpy of lead, if such exists. The summary indicates the state network has 2 Pb, while Louisville has 0 Pb (Jefferson County no longer has any high-lead emitters, so their previous source-oriented Pb monitors, e.g. near former secondary smelters, were shut down). The likely locations: One lead monitor is almost certainly at Louisville's NCore (Cannons Lane) or another representative site, because EPA requires each state to operate one Pb sampler at an NCore or suitable urban site even if no sources exist. The second Pb monitor might be in Hancock County or Daviess County, areas with an aluminum smelter and a past secondary lead smelter. The footnote "m" (PM_{10} filter analyzed for metals) suggests that one of the PM_{10} sites (possibly Hancock) is used to collect samples for lead analysis. This approach (PM_{10} or TSP filter lab analysis) is the standard method for measuring lead in ambient air.

Adequacy: Given the dramatic reduction of leaded gasoline and the closure of many lead-processing industries, ambient lead levels in Kentucky are very low. Kentucky currently has no nonattainment areas for lead. The network addresses the residual lead monitoring requirements by focusing on any remaining potential sources. For instance, if the Century Aluminum facility in Hawesville (Hancock Co.) had any lead emissions from its processes or on-site power plant, the nearby monitor would capture that. Similarly, regional background lead is being tracked by the NCore site's periodic TSP sampling. This satisfies 40 CFR Part 58 Appendix D which requires at least one Pb monitor at NCore and additional source-oriented monitors at facilities emitting significant lead. Kentucky identified no major lead sources over the threshold aside from perhaps a battery recycler that closed years ago. It appears EPA granted Kentucky a waiver from having to monitor at any specific lead source, since none are listed in the plan.

One related aspect is the monitoring of **hazardous metals other than lead**. The footnote "m" implies Kentucky is also analyzing PM filters for metals like arsenic, nickel, etc., possibly as part of air toxics surveillance or NATTS. For example, PM_{10} filters from Ashland or Louisville might be checked for metal air toxics. This is above and beyond federal requirements (which only mandate lead), but it's a good practice for broad public health surveillance. The plan doesn't detail NATTS participation; Kentucky is not listed as having a NATTS station, so these efforts are likely state-initiated or in response to specific community concerns (like arsenic near a steel mill, etc.).

Recommendation: The current lead monitoring setup meets federal requirements. It is recommended to continue the lead/TSP sampling at the designated sites at least on a 6-day schedule, as required, to ensure any unforeseen rise in lead levels would be caught. Given the low concentrations, QA is crucial – maintaining rigorous filter handling and low detection limit labs will keep the data meaningful. If any new industry with potential lead emissions opens in Kentucky, the state should be ready to deploy a source-oriented Pb monitor (for instance, a proposed battery recycling plant or ammunitions manufacturer would trigger this). In terms of broader metals monitoring, Kentucky could formalize a plan for periodically screening filters from different sites for toxic metals (this might already be happening as implied). For example, it would be beneficial to analyze a subset of $PM_{2.5}$ or PM_{10} filters for metals in industrial areas to track pollutants like manganese (near steel or alloy plants), hexavalent chromium (near plating operations), etc. This can be done through special studies or partnership with EPA's regional laboratory. Overall, no increase in routine lead monitors is necessary unless a new source appears, but maintaining analytical capability and vigilance is key. Finally, even though Louisville has no dedicated Pb monitor (since no source), the state could consider leveraging its metals analysis to include a site in Louisville occasionally for completeness. This would ensure that if any minor lead sources (like general aviation airports using leaded avgas) exist, their impact is not entirely unmonitored. In summary, **keep the two Pb sites active, and remain poised to adjust if industrial profiles change**.

Air Toxics and Other Pollutant Monitoring

Volatile Organic Compounds (VOCs) and Carbonyls

Kentucky's network measures VOCs and carbonyl compounds at a few specialized sites. The summary table shows 4 VOC monitoring instruments and 3 carbonyl sampling setups in the entire network. These primarily relate to the Photochemical Assessment Monitoring (PAMS) required measurements and possibly a special project. In Louisville, the Cannons Lane NCore/PAMS site operates a **continuous auto-GC** to measure a suite of ozone precursor VOCs (like ethylene, toluene, etc.) hourly, as well as a carbonyl sampler (DNPH cartridge) collecting 8-hour aldehyde samples every third day during ozone season. This fulfills EPA's mandate for precursor monitoring in the Louisville area starting 2021. The Louisville network summary indeed lists 2 VOC and 1 carbonyl monitor for APCD, consistent with an auto-GC and a cartridge sampler at one site (and possibly a backup or second location in the county). The state (KDAQ) also lists 2 VOC and 2 carbonyl monitors. Likely one set is at a state-operated PAMS site. Interestingly, Kentucky might have chosen an additional PAMS-type site at Lexington or elsewhere – but since PAMS was only federally required at Louisville's NCore, these might reflect special purpose monitoring. A strong clue is the **Calvert City special study**: Appendix G describes a one-year VOC sampling campaign near the Calvert City Industrial Complex starting October 2020. KDAQ collected 24-hr integrated canister samples for VOCs, focusing on certain chemicals (ethylene dichloride, vinyl chloride, etc.) of concern, with collocated precision checks and meteorology. This likely accounts for one "VOC monitor" on the state's tally (the year-long study at Calvert City Elementary). Another possible VOC monitoring location is in Ashland (Catlettsburg). While not explicitly stated, the Ashland area might benefit from toxics monitoring due to the refinery and past coke plant – KDAQ may have a canister program there or at least have done short-term sampling. If not, the listed second VOC sampler could be at the regional NCore-like site in Lexington or at a hazardous waste/chemical site (there was a mention of a Rubbertown Air Toxics project in Louisville's materials as well, but those would be Louisville's monitors).

Adequacy: There is no federal mandate for routine ambient toxic VOC monitoring except in national trend sites (NATTS) and PAMS. Kentucky does not host a NATTS site (e.g. Louisville could have been one but is not in the current NATTS list). Despite that, Kentucky is performing targeted toxics monitoring in areas of potential concern, which is commendable. The Calvert City study is a good example of addressing community health questions near a petrochemical hub. However, these efforts are **project-based and limited in duration**. Outside of Louisville's PAMS (which covers ~summer ozone season VOCs), there is no continuous, year-round toxics monitoring in Kentucky. That could be a gap if year-round exposure to certain HAPs (Hazardous Air Pollutants) is a concern. For example, the Rubbertown industrial area in Louisville has historically elevated concentrations of 1,3-butadiene and other HAPs; Louisville's APCD did run a special project called the "Rubbertown Air Toxics & Health Action Project". Through that, they operated manual toxics samplers in the community. Those data and any ensuing risk reduction

plans are not detailed in the state's annual network plan, but are part of local efforts. Similarly, downstate in places like Catlettsburg (refinery) or around the Blue Grass Army Depot (chemical weapon destruction facility), there may be unique pollutants (mustard agent breakdown products, etc.) that aren't captured by the routine network. The current network likely does not track those specifically.

Methodology: The methods used for VOC and carbonyl monitoring in Kentucky are standard: the PAMS auto-GC is a federal PAMS method (with flame ionization detector) for C2–C12 hydrocarbons, and carbonyls are collected on DNPH cartridges analyzed by HPLC (EPA TO-11A method). Canister samples in special studies would follow EPA Method TO-15 or similar, and indeed the Calvert City study was done in consultation with EPA Region 4, implying standard QA was applied. Black carbon monitoring (discussed below) also ties in as a surrogate for diesel PM, one of the air toxics.

Recommendation: Kentucky should sustain and potentially expand its air toxics monitoring efforts to ensure comprehensive coverage of hazardous pollutants. **For Louisville:** Continue the Rubbertown community monitoring and consider upgrading it into a more permanent neighborhood air toxics station, if resources allow. The success of reducing 1,3-butadiene in Louisville (due to industrial controls) was driven by having monitoring data; maintaining some level of HAP monitoring in that area will ensure levels remain in check. **For state-wide coverage:** Evaluate whether any city or region with significant industrial or traffic emissions might merit joining EPA's NATTS program or a state-equivalent toxics network. For example, a long-term toxics station in Ashland or Calvert City could serve as a trend site to track progress (post-study in Calvert City, perhaps a lighter sampling schedule could be continued). Partnering with EPA or universities for a pilot fenceline monitoring project at the Marathon refinery could also provide ongoing VOC data to the community. In the interim, Kentucky can leverage low-cost technologies: emerging passive samplers and small sensor systems for certain VOCs or benzene could be deployed near facilities on a rotating basis as a "survey." The plan already mentions exploring low-cost sensors and special projects – this should explicitly include sensors for HAPs, not just criteria pollutants. Data from any such sensors, while not FEM quality, can identify spikes or leaks that warrant more detailed follow-up.

In summary, **build on the PAMS and special studies platform**: keep PAMS VOC/carbonyl monitoring fully operational (including data reporting to EPA AQS as Louisville is now doing), reinstitute periodic toxics studies in known hotspots (perhaps every few years to check trends in Calvert City, Ashland, etc.), and consider establishing at least one permanent multi-HAP monitoring site outside Louisville to serve as a reference for rural/industrial air toxics levels in Kentucky. These steps will strengthen the network's ability to catch non-criteria pollutants that can affect health.

Particulate Toxics: PAHs and Black Carbon

The network plan lists 1 PAH monitor and 1 black carbon monitor in Kentucky. Polycyclic Aromatic Hydrocarbons (PAHs) are carcinogenic organic compounds often measured via filters or specialized instruments (e.g. fluorescence-based PAH monitors). The single PAH monitor is likely in Louisville, possibly as part of the West Louisville air toxics project or at the near-road site (diesel exhaust contains PAHs). Louisville has historically measured Benzo[a]pyrene and other PAHs on filters in certain studies. If the plan lists 1 PAH for the whole network, it suggests there is currently one active PAH measurement location – it could be in Louisville's network, or possibly at a state site like Ashland (if a coke oven facility was active, though AK Steel's coke plant closed). The more likely case is Louisville measuring PAHs near Rubbertown or the traffic corridor.

Black Carbon (BC) is measured by aethalometers or similar devices that optically gauge the light-absorbing fraction of PM (commonly associated with diesel soot). The plan clearly identifies a black carbon monitor at the **Durrett Lane near-road site** in Louisville. This instrument helps quantify diesel particulate levels from traffic separate from total $PM_{2.5}$. Black carbon monitoring is not required by EPA, so Kentucky's inclusion of it is a progressive step to understand local exposure disparities (near highways) and to have a metric for combustion particles.

Adequacy: For PAHs, having only one monitor means spatial coverage is very limited. PAH levels can vary, being higher near highways, industrial combustion sources, or areas with significant wood burning. Kentucky's one monitor likely provides data on an area of known concern (maybe urban Louisville). No PAH monitoring in other regions means that, for instance, we don't have direct PAH data in coal-burning regions or near the refinery, etc., but those may not be as high priority if there's no indication of issues. Black carbon, while measured at one site, could be similarly useful at other near-road environments (e.g. one might glean value from BC measurements in say Northern KY by Cincinnati's traffic, or around heavily trafficked freight corridors like I-65 in Bowling Green). But given resource constraints, focusing on Louisville's worst-case is understandable.

Recommendation: Continue the operation of the black carbon monitor at the Louisville near-road site, and ensure its data is utilized in assessing trends in diesel pollution and in public communications (e.g. Louisville can show community that diesel soot levels are being tracked). For PAHs, evaluate the current monitoring objectives: if the one PAH sampler is yielding data used in a risk assessment or compliance (some states have state PAH ambient standards), then maintain it. If not, perhaps repurpose it or relocate it periodically to gather data from different locations. For instance, one year focus on West Louisville, next year move PAH sampler to Ashland area, etc., to map PAH distribution. If feasible, using newer tech like a real-time PAH monitor (e.g. PAS or PUF sampler with shorter cycles) could provide better temporal resolution than integrated filters.

In the broader sense, Kentucky might incorporate these particulate toxics metrics into its **data reporting standards**: e.g., share annual summaries of black carbon and PAH levels in the network plan or websites, to highlight these non-regulated pollutant trends. Even though not required, this transparency builds public trust. Considering OSHA, PAHs and diesel particulate are occupational concerns (diesel exhaust is classified as a carcinogen), so by monitoring black carbon in ambient air, Kentucky is indirectly also addressing an occupational health interest for outdoor workers. If black carbon levels drop due to cleaner engines, both community and worker exposures benefit.

Meteorological Measurements and Other Sensors

Kentucky operates meteorological instrumentation at 7 sites (5 in Louisville, 1 state, 1 NPS as per the summary). These typically include wind speed, wind direction, temperature, humidity, and sometimes solar radiation and mixing height at PAMS/NCore sites. Meteorological data are crucial for interpreting pollutant levels and are required as part of PAMS (e.g. upper air measurements, surface met). The plan's Louisville appendix mentions a ceilometer for mixing height and full meteorological suite at the PAMS site. State sites likely have at least wind and temperature at regional ozone locations (e.g. the Mammoth Cave NPS site definitely logs met data, as do some regional offices' sites).

Adequacy: The meteorological coverage is reasonable – major monitoring sites have onsite met to correlate with pollution (e.g. wind data at near-road sites to see if highway plume is impacting, etc.). In complex terrain regions (like valleys of eastern KY), a local met station at the monitor is very helpful to see stagnation conditions. The plan doesn't detail all met, but at least one in each region is present. Low-cost sensors are mentioned as being used in special projects. This likely refers to pilot studies where DAQ or Louisville tests newer small sensors for public awareness or supplemental data. While these are not part of the official network, exploring them is forward-thinking.

Recommendation: Keep meteorological stations well-maintained and calibrated (especially wind sensors, which are critical for back-trajectory and dispersion analysis). It's recommended to upgrade any older met equipment to "Air Quality Measurements approved" sensors as noted in the PAMS requirements – Louisville appears to have done so in 2021. Kentucky should ensure each regional office or primary monitoring region has at least one full meteorological station feeding data to both analysts and public archives. For low-cost sensors, the recommendation is to develop a formal framework for using them: for example, deploy sensor networks in communities as an educational tool, or as an early warning system in areas far from official monitors. Any data from such sensors should be vetted and clearly distinguished from regulatory data, but can help identify localized issues (like neighborhood wood smoke, traffic hot-spots, etc.). By the next network assessment, Kentucky could report on any findings from pilot low-cost sensor projects and consider if some might be integrated into public-facing air quality information systems (with appropriate caveats).

Furthermore, consider enhancing data reporting standards by including meteorological context with air quality alerts (e.g. mention when stagnant winds are causing pollutant build-up). Since the prompt asks about data reporting: Kentucky reports real-time data to EPA AIRNow and their own websites; a recommendation is to also report comparisons to any applicable state standards or guidelines for non-criteria pollutants (like H_2S odor threshold or Air Toxics Reference concentrations) to give the public a fuller picture. For example, Louisville might report when the Algonquin H_2S levels approach the state's odor annoyance standard. This goes slightly beyond federal requirement but is good practice for community engagement.

Conclusions and Recommendations

Summary of Adequacy: In general, the 2025 Kentucky Ambient Air Monitoring Network Plan reflects a well-designed and well-maintained monitoring network that largely meets EPA's requirements and aligns with federal ambient monitoring regulations. The network has sufficient spatial coverage of criteria pollutants across Kentucky's diverse regions, addresses areas of known high pollution (urban centers, industrial zones, near-road locations), and employs approved methods (FRM/FEM instruments) with appropriate quality assurance. Kentucky has also embraced newer monitoring initiatives such as near-road NO_2 and PAMS ozone precursor monitoring, demonstrating compliance with recent federal mandates. The inclusion of special purpose monitors (for air toxics, H_2S, black carbon, etc.) shows responsiveness to state and local air quality concerns beyond the national minimum criteria.

Identified Gaps/Deficiencies: The review did not find any gross violations or omissions in required monitoring; however, several areas for improvement were noted:

- **Siting Issues:** Two sites (Hazard and Somerset) require continued waivers for minor siting criteria deviations (proximity to low-traffic roads). While EPA has accepted these due to extenuating circumstances, in the long run Kentucky should try to resolve these (e.g. by slight relocations) if feasible, to meet all Appendix E criteria without waivers.
- **Industrial Coverage:** Although major industrial regions are mostly covered, a few could use better monitoring. Notably, Calvert City had only a temporary study for toxic VOCs – there is no permanent station continuously watching that area's emissions. The Ashland/Catlettsburg area might benefit from more routine toxics or particulate monitoring given the refinery and past industries. Similarly, after the Paducah DOE site ceased operations, no criteria pollutant monitors were stationed nearby (understandable since emissions dropped) but radiological monitoring is left to a separate program. The lack of a RadNet station in western KY means any radiological release in that region would rely on distant monitors in central KY. These are not regulatory requirements per se, but gaps in a holistic risk-based coverage.
- **Continuous Monitoring and Technology:** The network could modernize a bit further. For example, PM_{10} is still entirely manual except in Louisville; deploying continuous coarse PM monitors would improve data richness. Some smaller $PM_{2.5}$ sites still use intermittent FRMs – though supplemented by nearby continuous sites, eventually all areas might have real-time $PM_{2.5}$. Kentucky has only one NCore site (Louisville); while only one is required, a second multi-pollutant site in a different setting (e.g. a regional rural site or Lexington urban site) could strengthen data for nationwide programs. However, resource limitations may preclude that.
- **Air Toxics and PAH Monitoring:** Outside of PAMS, the hazardous air pollutant monitoring is limited and not continuous. Communities near certain industries may feel

their pollutants of concern (air toxics, odors) are not fully captured by the permanent network, even though Kentucky addresses some via special projects. This can be viewed as a network deficiency in terms of community coverage, if not in federal metrics.

- **Data Reporting:** While Kentucky reports criteria pollutant data to EPA in a timely fashion (and had an honest discussion about delays in initial PAMS data reporting), there is always room to improve transparency. For instance, making all special study results public (the plan references an EPA site for the Calvert City study data) and integrating those findings into future network decisions is important. Also, ensuring the public can easily access real-time H_2S levels, VOC measurements, etc., perhaps via a state dashboard, would be beneficial. This is not a strict deficiency, but an area to enhance.

Recommendations for Improvement: Based on the above analysis, the following detailed recommendations are offered to strengthen Kentucky's ambient monitoring network:

- **Station Siting and Infrastructure:** Proactively address known siting issues – for example, explore moving the Hazard $PM_{2.5}$ sampler a few meters farther from the road (if terrain allows) to eliminate the Appendix E distance waiver. Similarly, for Somerset, investigate whether slight reorientation or a different spot on the property could meet the 15 m setback requirement. These changes may require modest investment (a new pad or shelter move) but would eliminate the need for waiver renewals. Ensure vegetation growth or new obstructions are routinely checked at all sites, preventing new siting non-compliance from creeping in.
- **Enhance Monitoring near Key Industrial Facilities:** Consider establishing permanent or semi-permanent monitoring stations in the vicinity of large industrial complexes currently without year-round monitors. Specifically, a dedicated station in Calvert City could continuously measure VOCs (with passive samplers or a small auto-GC) and perhaps $PM_{2.5}$, to provide ongoing data to the community and regulators post-study. In the Ashland area, adding a toxics sampler (e.g. for benzene, toluene, etc.) at the Ashland Primary site or a nearby location in Catlettsburg would directly track refinery emissions impact. Even if run on a rotational basis (one year on, one year off), it would be an improvement. Kentucky should leverage EPA's Community-Scale Air Toxics grants or upcoming federal funding to support such monitors in key fenceline communities.
- **Leverage the Paducah DOE Oversight Data:** While not part of DAQ's network, the Division of Waste Management's AIP monitoring around PGDP generates data on radionuclides, fluoride, and other pollutants. It's recommended that DAQ coordinate with that program to incorporate a summary of air-related findings into the annual network assessment. For example, if the state's independent monitoring around PGDP shows any concerning air concentrations (even of non-NAAQS pollutants like uranium or TCE), DAQ could decide to supplement with its own monitors (like SO_2, $PM_{2.5}$ if diesel generators are used on site, etc.). Essentially, break down silos between programs to

ensure ambient air risks are fully addressed. Also, advocate for a RadNet station placement in far western Kentucky – perhaps in Paducah city – to enhance early detection capability for radiological events.

- **Modernize Instruments Where Feasible:** Transition remaining filter-only $PM_{2.5}$ sites to continuous monitors, while retaining filter collection ability via collocation. The plan shows only 3 manual $PM_{2.5}$ samplers left; these could be kept for collocated QA, but primary data could come from FEM units. Acquire a couple of continuous PM_{10} (or combo $PM_{2.5}/PM_{10}$) monitors for state areas – for example, replacing the Owensboro or Ashland PM_{10} HiVol with a BAM1020 or Teledyne T640x. This would align Kentucky with the growing practice of continuous coarse monitoring and provide real-time coarse dust data (useful for public dust complaints or events like Saharan dust incursions).
- **Expand Near-road and Localized Monitoring:** Evaluate whether additional near-road monitoring is needed in a growing urban area like Lexington. If NO_2 and CO are indeed very low, a compromise could be to deploy a $PM_{2.5}$ and black carbon sensor near a busy road in Lexington to see if any notable gradient exists relative to the city's existing background site. This low-cost approach, if it finds elevated readings, could justify adding a formal near-road station in the future. In Louisville, beyond NO_2 and CO, consider if the I-264 near-road site should also measure ultrafine particles (UFP) or ammonia – not required, but some near-road sites do for research. Such data could inform health studies on traffic pollution.
- **Continuous Air Toxics Efforts:** Institutionalize some of the special studies. For instance, make the Calvert City VOC monitoring an every-5-year recurring project to track trends, or maintain a single canister sampler long-term with reduced frequency (e.g. one 24-hr sample a month) to keep a baseline dataset. Do likewise for other areas of concern (Rubbertown – though Louisville does this, perhaps share with state; and maybe one in the eastern KY oil/gas fields or urban Lexington for downtown toxics from vehicles). If resources allow, pursuing a dedicated NATTS site designation for Kentucky (for example, in Louisville or Paducah) would bring federal support and a consistent long-term toxics dataset.
- **Data Transparency and Reporting:** Improve the network's public data reporting by integrating all pollutants. Currently, citizens can readily find AQI for criteria pollutants, but not as easily the data for toxics like benzene or H_2S. Kentucky should consider publishing an annual "State of the Air Toxics" report or an online dashboard that includes summaries of VOC, carbonyl, PAH, and metal measurements, alongside the criteria pollutant statistics. This would align with recommendations in EPA's air monitoring assessment guidance to enhance stakeholder engagement. In doing so, use plain language to explain what the levels mean relative to health benchmarks (EPA risk levels, ATSDR reference concentrations, OSHA limits for context, etc.).

- **Prepare for Future Standards and Emerging Pollutants:** Keep an eye on EPA's ongoing reviews – for example, if the $PM_{2.5}$ annual NAAQS is tightened, Kentucky might need additional neighborhood-scale $PM_{2.5}$ monitors in urban areas to ensure compliance margins. Similarly, if climate change leads to more wildfire smoke impacts in Kentucky, the state might deploy temporary smoke monitors (as done out West) to affected areas. Formaldehyde and ethylene oxide are emerging concerns nationally; Kentucky could pre-emptively include these in lab analyses of air toxics samples to understand background levels. Essentially, build flexibility into the network to monitor new pollutants of concern (even PFAS in air near fire training areas, ammonia near large livestock operations, etc., could be future topics).

In conclusion, Kentucky's ambient monitoring network for 2025 is fundamentally sound and compliant with EPA (and relevant federal) standards. It provides a solid backbone of criteria pollutant monitoring across the state and demonstrates proactive enhancements in areas like near-road and PAMS measurements. By implementing the recommendations above – focusing on incremental improvements in site siting, technology upgrades, expanded toxics coverage, and data transparency – Kentucky can further elevate the quality and completeness of its air monitoring infrastructure. These steps will help ensure that the network not only meets all current federal requirements but is also positioned to address future air quality challenges and to protect public health across all communities in the Commonwealth.

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BY
REGIONAL OFFICE

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