

2025 Ambient Air Monitoring 5 Year Network Assessment for Shelby County, TN



**Air Pollution Control Section
Air Monitoring Branch
Memphis, TN**



Table of Contents

1. Monitoring Network Description	8
1.1 Pollutant Description.....	10
1.2 Site Description	10
2. Monitoring Objectives and Site Types.....	12
2.1 Introduction	12
2.2 Monitoring Objectives.....	13
2.3 Site Types.....	13
2.4 Spatial Scales	14
2.5 Correlation Analysis.....	15
2.6 Minimum Numbers of Monitors	15
3. Population of Memphis TN-AR-MS CBSA	15
4. Meteorological Conditions.....	22
5. Pollutant Network Assessment.....	23
5.1 Ozone Monitoring Network	26
5.2 Nitrogen Oxides Monitoring Network	39
5.3 Carbon Monoxide Monitoring Network	48
5.4 Sulfur Dioxide Monitoring Network.....	56
5.5 PM _{2.5} Monitoring Network.....	63
5.6 PM ₁₀ Monitoring Network	72
6. Summary of 2017 Emissions in Shelby County	79
7. References	79

Acronyms and Abbreviations

AADT	Annual Average Daily Traffic
AQI	Air Quality Index
AQS	Air Quality System
CFR	Code of Federal Regulations
CBSA	Core Based Statistical Area
CFR	Code of Federal Regulations
EPA	Environmental Protection Agency
FEM	Federal Equivalent Method
FRM	Federal Reference Method
HAP	Hazardous Air Pollutant
MSA	Metropolitan Statistical Area
NAAQS	National Ambient Air Quality Standards
NCore	National Core Network
NEI	National Emissions Inventory
PM	Particulate Matter
PWEI	Population Weighted Emissions Index
SCHD AMB	Shelby County Health Department Ambient Air Monitoring Branch
SLAMS	State and Local Air Monitoring Stations
VOC	Volatile Organic Compound

Figures

Figure 1	Annual Estimates of Resident Population in Shelby County from 2020 to 2024	17
Figure 2	Annual Estimates of Resident Population in Crittenden County from 2020 to 2024	18
Figure 3	Annual Estimates of Resident Population in Desoto County from 2020 to 2024	18
Figure 4	Geographic Map of Shelby County and Estimated Percentage of People under the age of 5 in 2024.....	19
Figure 5	Geographic Map of Shelby County and Estimated Percentage of People over the age of 65 in 2024.....	19
Figure 6	Geographic Map of Crittenden County and Estimated Percentage of People under the age of 5 in 2024.....	20
Figure 7	Geographic Map of Crittenden County and Estimated Percentage of People over the age of 65 in 2024.....	20
Figure 8	Geographic Map of Desoto County and Estimated Percentage of People under the age of 5 in 2024.....	21
Figure 9	Geographic Map of Desoto County and Estimated Percentage of People over the age of 65 in 2024.....	21
Figure 10	Wind Rose for Memphis International Airport from 2020 to 2024.....	22
Figure 11	Geographic Map of Shelby County Air Monitoring Sites.....	23
Figure 12	Geographic Map of Memphis CBSA Air Monitoring Sites	24
Figure 13	Demographics for Area Served by Air Monitoring site 47-157-1004. Graph is made with the NetAssess2025 tool	28
Figure 14	Demographics for Area Served by Air Monitoring site 47-157-0021. Graph is made with the NetAssess2025 tool	28
Figure 15	Demographics for Area Served by Air Monitoring site 47-157-0075. Graph is made with the NetAssess2025 tool	29
Figure 16	Demographics for Area Served by Air Monitoring site 28-033-0002. Graph is made with the NetAssess2025 tool	30
Figure 17	Demographics for Area Served by Air Monitoring site 05-035-0005. Graph is made with the NetAssess2025 tool	30
Figure 18	Annual 4 th Maximum and Design Value Trends for Ozone at site 47-157-1004.....	31
Figure 19	Annual 4 th Maximum and Design Value Trends for Ozone at site 47-157-0021.....	32
Figure 20	Annual 4 th Maximum and Design Value Trends for Ozone at site 47-157-0075.....	32
Figure 21	Annual 4 th Maximum and Design Value Trends for Ozone at site 28-033-0002.....	33
Figure 22	Annual 4 th Maximum and Design Value Trends for Ozone at site 05-035-0005.....	33

Figure 23	Memphis CBSA Air Monitoring Ozone Network Correlation Data. Graph is made with the NetAssess2025	34
Figure 24	Figure 24. Map of facilities in Shelby County for 2017 VOC emissions (2020 map unavailable). Graph and chart data are extracted from the EPA 2020 NEI website.....	35
Figure 25	Percentage Comparison of Point Sources to Mobile/Non-Point Sources of VOC in Shelby County, Tennessee. Data compiled from EPA 2020 NEI.....	36
Figure 26	Percentage Comparison VOC Mobile/Non-Point Sources in Shelby County, Tennessee. Data compiled from EPA 2020 NEI.....	36
Figure 27	Annual NAAQS and Memphis Area Design Value Trends for NO ₂ at sites 47-157-0100 (Macon Cove-Near Road), 05-035-0005 (Marion, AR), and 47-157-0075 (Shelby Farms-PAMS).....	41
Figure 28	1-hour NAAQS and Memphis Area Design Value Trends for NO ₂ at sites 47-157-0100 (Macon Cove-Near Road), 05-035-0005 (Marion, AR), and 47-157-0075 (Shelby Farms-PAMS).....	42
Figure 29	Memphis CBSA Air Monitoring NO ₂ Network Correlation Data. Graph is made with the NetAssess2025 tool.....	43
Figure 30	Map of facilities in Shelby County for 2017 nitrogen oxides emissions (2020 map unavailable). Graph and chart data are extracted from EPA 2020 NEI website.	44
Figure 31	Percentage Comparison of Point Sources to Mobile/Non-Point Sources of Nitrogen Oxides in Shelby County, Tennessee. Data compiled from EPA 2020 NEI.....	45
Figure 32	Percentage Comparison of Nitrogen Oxides Mobile/Non-Point Sources in Shelby County, Tennessee. Data compiled from EPA 2020 NEI.....	45
Figure 33	Annual Highest 1-hr Maximum Trend for CO at Shelby County sites.....	49
Figure 34	Annual 2 nd 8-hr Maximum Trend for CO at Shelby County sites.....	50
Figure 35	Memphis CBSA Air Monitoring CO Network Correlation Data. Graph is made with the NetAssess2025.....	51
Figure 36	Map of facilities in Shelby County for 2017 Carbon Monoxide emissions (2020 map unavailable). Graph and chart data are extracted from EPA 2020 NEI website.....	52
Figure 37	Percentage Comparison of Point Sources to Mobile/Non-Point Sources of Carbon Monoxide in Shelby County, Tennessee. Data compiled from EPA 2020 NEI.....	53
Figure 38	Percentage Comparison of Carbon Monoxide Mobile/Non-Point Sources in Shelby County, Tennessee. Data compiled from EPA 2020 NEI.....	53
Figure 39	Annual 99 th Percentile and Design value trends for Shelby County including the sole SO ₂ site at Shelby Farms-NCore (47-157-0075).....	57
Figure 40	Memphis CBSA Air Monitoring SO ₂ Network. Graph is made with the NetAssess2025.....	58

Figure 41	Map of facilities in Shelby County for 2017 SO ₂ emission sources (2020 Map unavailable). Graph and chart are extracted from EPA 2017 NEI 2020 website.....	59
Figure 42	Percentage Comparison of Point Sources to Mobile/Non-Point Sources of Sulfur Dioxide in Shelby County, Tennessee. Data compiled from EPA 2020 NEI.....	60
Figure 43	Percentage Comparison of Sulfur Dioxide Mobile/Non-Point Sources in Shelby County, Tennessee. Data compiled from EPA 2020 NEI.....	60
Figure 44	Memphis MBSA PM _{2.5} Daily NAAQS Design Values Historic Trend (2007-2024) for active sites.....	64
Figure 45	Memphis CBSA PM _{2.5} Annual NAAQS Design Values Historic Trend (2007-2024) for active sites.....	65
Figure 46	Memphis CBSA PM _{2.5} Network Correlation Data. Graph is made with the NetAssess2025 tool.....	66
Figure 47	Map of facilities in Shelby County for 2017 PM _{2.5} in Shelby County for (2020 Map unavailable). Graph and chart data are extracted from EPA 2020 NEI website.....	67
Figure 48	Percentage Comparison of Point Sources to Mobile/Non-Point Sources of Sulfur Dioxide in Shelby County, Tennessee. Data compiled from EPA 2020 NEI.....	68
Figure 49	Percentage Comparison of PM _{2.5} Mobile/Non-Point Sources in Shelby County, Tennessee. Data compiled from EPA 2020 NEI.....	68
Figure 50	Shelby County Air Monitoring Network for PM ₁₀ sites showing trend for maximum daily value of every year per site (values are in µg/m ³)... 73	
Figure 51	Shelby County Air Monitoring Network for PM ₁₀ sites showing trend for 2 nd maximum daily value of every year per site (values are in µg/m ³).....	73
Figure 52	Memphis CBSA air monitoring PM ₁₀ network correlation data. Graph is made with the NetAssess2025 tool.....	74
Figure 53	Map of facilities in Shelby County for 2017 PM ₁₀ in Shelby County for (2020 Map unavailable). Table 20 data is extracted from EPA 2020 NEI website.....	75
Figure 54	Percentage Comparison of Point Sources to Mobile/Non-Point Sources of PM ₁₀ in Shelby County, Tennessee. Data compiled from EPA 2020 NEI.....	76
Figure 55	Percentage Comparison of PM ₁₀ Mobile/Non-Point Sources in Shelby County, Tennessee. Data compiled from EPA 2020 NEI.....	76

Tables

Table 1	Air Monitoring Network in Shelby County	7
Table 2	Estimated Population of Memphis CBSA.....	13
Table 3	Correlated Air Monitoring Sites in Desoto County, MS and Crittenden County, AR.....	20
Table 4	Criteria Pollutants and NAAQS	21
Table 5	SLAMS Minimum Ozone (O ₃) Monitoring Requirements	22
Table 6	2024 Ozone Design Values in Memphis CBSA	22
Table 7	2020 National Emissions Inventory for VOC	31
Table 8	2024 Ozone Design Values in Memphis TN-AR-MS CBSA	33
Table 9	2020 National Emissions Inventory for Nitrogen Oxides.....	37
Table 10	2024 O ₃ Design Value in Memphis CBSA	39
Table 11	2020 National Emissions Inventory for Carbon Monoxide (CO).....	43
Table 12	2020 National Emissions Inventory for Sulfur Dioxide (SO ₂)	49
Table 13	SLAMS Minimum PM _{2.5} Monitoring Requirements	50
Table 14	2024 PM _{2.5} Annual Design Values in Shelby County	51
Table 15	2020 National Emissions Inventory for PM _{2.5}	56
Table 16	SLAMS Minimum PM ₁₀ Monitoring requirements	58
Table 17	2020 National Emissions Inventory for PM ₁₀ in Shelby County	61
Table 18	2020 Emission Inventory of All Sources in Shelby County	63

1. Monitoring Network Description

The Shelby County Health Department (SCHD) operates six air monitoring stations at five air monitoring sites in Shelby County, Tennessee. The earliest and oldest air monitoring station is an ozone site located at 1330 Frayser Blvd in Memphis. The newest air monitoring station, Shelby Farms-PAMS was established in 2021 and is located on the pre-existing Shelby Farms site at 6388 Haley Road in Memphis. This is the Photochemical Assessment Monitoring Station (PAMS) located on Shelby County property adjacent to Shelby Farms Park. Table 1 provides a list of the active sites in the Shelby County network listed by site name, pollutants measured, monitor type and Air Quality System (AQS) ID. This list is subject to change, as the Shelby County Health Department is submitting a proposal to expand the air monitoring network to the U.S. Environmental Protection Agency (EPA). Pending approval, the SCHD intends to add an air monitoring site in South Memphis where there is a significant lack of air quality data.

As part of a joint effort between the Mississippi Department of Environmental Quality (MDEQ), the Arkansas Department of Environmental Quality (ADEQ) and the Shelby County Health Department, a Memorandum of Agreement was developed to collectively meet the Environmental Protection Agency's (EPA) minimum monitoring requirements for nitrogen dioxide, particulate matter and ozone as well as other criteria pollutants air monitoring deemed necessary to meet the needs of the Memphis Core Based Statistical Area (CBSA).

Table 1. Air Quality Monitoring Network in Shelby County

Site Address	Pollutant	Monitor	AQS ID
416 Alabama Ave.	PM ₁₀ continuous PM _{2.5} (3 day)	TEOM 1405 Thermo Scientific 2025i	47-157-0024
6855 Mudville Road (Edmund Orgill Park)	O ₃ continuous	Teledyne API T400	47-157-1004
1330 Frayser Blvd	O ₃ continuous	Teledyne API T400	47-157-0021

6388 Haley Road (NCore)	CO continuous (trace) SO ₂ continuous (trace) NO/NO _y continuous (trace) O ₃ continuous PM ₁₀ STP continuous PM ₁₀ (LC) continuous PM _{2.5} (LC) continuous PM _{2.5-10} continuous PM _{2.5} (3 day) filter (collocated) PM _{2.5} Speciation (3 day) Carbon (URG)(3 day) Wind Speed Wind Direction Ambient Temperature Relative Humidity Barometric Pressure	Teledyne API 300U Teledyne API 100U Teledyne API T200U Teledyne API T400 Teledyne API T640x Teledyne API T640x Teledyne API T640x Teledyne API T640x Thermo Scientific 2025i Met One SuperSASS URG 3000 RM Young Wind Sensor- 05305 RM Young 41382VC RM Young	47-157- 0075
6388 Haley Road (PAMS)	Sky Ceiling Heights Rainfall Solar Radiation Total UV Radiation VOC/Gas Chromatography Carbonyls True Nitrogen Dioxide (trace)	Vaisala CL51 RM Young 52202 Heated Tipping Bucket Rain Gauge Epply PSP Epply Total UV Radiometer Chromatotec GC866 auto GC Analyzer ATEC 8000 Carbonyl Cartridge Sampler Teledyne API T500U	
5767 Macon Cove (Near Road)	CO continuous NO ₂ continuous PM _{2.5} FRM filter	Teledyne API T300 Teledyne API T200 Thermo Scientific 2025i	47-157- 0100

1.1 Pollutant Description

1.1.1 Carbon Monoxide

Ambient carbon monoxide (CO) monitors measure concentrations at 2 locations (47-157-0075 and 47-157-0100). The CO monitor at Shelby Farms (47-157-0075) measures CO concentration at the trace level, while the CO monitor at (47-157-0100) at low-levels, but not trace concentrations. CO measurements meet the requirements of 40 CFR Part 58, Appendix D.

1.1.2 Nitrogen Oxides

The SCHD AMB operates two sites that meet current regulatory requirements, one near-road low-level nitrogen dioxide (NO/NO₂/NO_x) station (47-157-0100) and one area-wide trace level Shelby Farms/NCore site (47-157-0075) for measuring NO/NO_y. The Shelby Farms/NCore site (47-157-0075) also operates a True NO₂ monitor as part of the national PAMS program, but this instrument only operates during the PAMS season (June-August). The Nitrogen Oxides measurements meet the requirements of 40 CFR Part 58, Appendix D.

1.1.3 Ozone

Ozone concentrations are measured at three site locations (47-157-0075, 47-157-1004 and 47-157-0021). The monitoring stations meet the requirements of 40 CFR Part 58, Appendix D for monitoring objectives and monitoring site types. The three stations operated by the SCHD AMB meet the minimum requirements for ozone monitoring stations in Shelby County.

1.1.1 Particulate Matter 2.5

The Particulate Matter 2.5 (PM_{2.5}) network consists of three site locations (47-157-0075, 47-157-0024 and 47-157-0100). The PM_{2.5} samplers measure PM_{2.5} concentrations continuously or collect PM_{2.5} samples on a one-in-three-day schedule. The PM_{2.5} monitoring network operated by the SCHD AMB meets the monitoring objectives defined in 40 CFR Appendix D.

1.1.4 Particulate Matter 10

The Particulate Matter 10 (PM₁₀) network consists of two site locations (47-157-0024 and 47-157-0075). The PM₁₀ samplers measure PM₁₀ concentration continuously at both sites.

1.1.5 Sulfur Dioxide

Sulfur dioxide (SO₂) concentrations are measured at the NCore site (47-157-0075) which meets EPA requirements.

1.2 Site Description

Although the number of air monitoring sites in the SCHD AMB network remain at 5, an additional station (PAMS) began operation on the Shelby Farms site in 2021. In 2025, the SCHD is submitting a proposal to add a sixth monitoring site to the EPA.

1.2.1 Alabama Avenue

The Alabama site was originally established in 1973 at its current location 416 Alabama Ave. This site is currently located on Shelby County Government property. The active sampling instruments include one continuous PM₁₀ sampler and a 1-in-3-day schedule PM_{2.5} sampler. The SCHD AMB anticipates replacing the PM₁₀ continuous sampler and the PM_{2.5} filter sampler (POC 2) with a continuous Teledyne T640x instrument later in 2025. The infrastructure of the facility is in good condition. The site does meet 40 CFR Part 58 Appendix E probe siting criteria. Synergies between air monitoring programs include the U.S. EPA Radnet program.

1.2.2 Edmund Orgill

The Edmund Orgill site was originally established in 1980 at its current location 6855 Mudville Rd. in the city of Millington. The site is currently located on Shelby County Government property. The SCHD AMB does not anticipate any changes for the Edmund Orgill site soon. The infrastructure of the facility is in fair condition. Only ozone measurement is conducted at the Edmund Orgill site. The current building has been in place for the last 30 years and needs repair or replacement due to poor insulation and tie-down replacement. The site does meet 40 CFR Part 58 Appendix E Probe Siting Criteria. In addition to NAAQS comparison, the data is used for air modeling purposes, data research, real-time air quality updates to the public, and the SCHD daily air pollution forecasting program.

1.2.3 Frayser

The Frayser site was established at its current location 1330 Frayser Blvd. in 1972. The site is currently located on Shelby County Government property. The SCHD AMB does not anticipate any changes for the Frayser site soon. The infrastructure of the facility is in good condition. The shelter at the location was replaced in 2019. Currently only ozone measurement is conducted at the Frayser site. The site does meet 40 CFR Part 58 Appendix E Probe Siting Criteria. In addition to NAAQS comparison, the data is used for air modeling purposes, data research, real-time air quality updates to the public, and the SCHD daily air pollution forecasting program.

1.2.4 Shelby Farms (NCore and PAMS)

The Shelby Farms site was originally established in 2011 at its current location 6388 Haley Rd. The site is currently located on Shelby County Government property adjacent to Shelby Farms Park. The SCHD AMB does not anticipate any changes for the current gas instruments or particulate matter at the NCore and PAMS sites soon. The infrastructures of both buildings are in good condition. The active sampling instruments include trace level analyzers for CO, NO/NO_y, and SO₂, continuous PM_{2.5}/PM₁₀/PM Coarse sampling, 1- in 3- day sampling schedule for PM_{2.5} monitoring (collocated), and an O₃ analyzer. The station meets 40 CFR Part 58 Appendix E and 40 CFR Part 58 Appendix D requirements. In addition to NAAQS comparison, the data is used for air modeling purposes, and data research. Ozone and PM_{2.5} applications also include real-time air quality updates to the public, and the SCHD daily air pollution forecasting program.

The PAMS station located at the Shelby Farms site is only active during the PAMS season from June through August each year as part of the nationwide EPA PAMS ozone research program. The active monitoring equipment include a continuous True-Nitrogen Dioxide (NO₂) analyzer, a continuous gas chromatograph sampler, a Carbonyl sampler 1-in-3 day (each run day includes 3 8-hour samples), along with several continuous support instruments (solar radiation, total UV radiation, rainfall, cloud ceiling detection). The PAMS station does meet 40 CFR Part 58 Appendix D requirements.

1.2.5 Macon Cove-Near Road (SWTCC)

In February 2010, the EPA amended its National Ambient Air Quality Standard (NAAQS) for Nitrogen Dioxide (NO₂). In this rule, the EPA required to capture short-term NO₂ concentrations near heavily trafficked roads to assess area-wide NO₂ concentrations for vulnerable and susceptible populations. State and local agencies are required to utilize six factors in the site selection process: traffic volumes, fleet mix, roadway design, traffic congestion patterns, local terrain, or topography and meteorology. The site currently continuously monitors Carbon Monoxide (CO), and Nitrogen Oxides (NO/NO₂/NO_x). A 1-in-3-day PM filter (FRM) sampler is also located at the site. A continuous Teledyne T640x monitor is planned to be added to the site later in 2025 adding continuous PM_{2.5} and PM₁₀.

In addition to NAAQS comparison, the data is used for air modeling purposes, and data research. When continuous PM_{2.5} is added, real-time air quality updates will be available to the public, and the site will be included as part of the SCHD daily air pollution forecasting program. The Macon Cove-Near Road site was established in 2014 at its current location 5767 Macon Cove in Memphis. The site is currently located on the Tennessee Board of Regents property at Southwest Tennessee Community College (SWTCC). If the Community College expands in the future, the site may have to be relocated. The infrastructure of the facility is in good condition. The site does meet requirements for both 40 CFR Part 58 Appendices D and E.

2. Monitoring Objectives and Site Types

2.1 Introduction

The Shelby County Health Department (SCHD) Pollution Control Section (PCS) Ambient Air Monitoring Branch (AMB) operates an ambient air monitoring network required by the United States Environmental Protection Agency (EPA). This monitoring network is to provide air quality monitoring services for the Shelby County, Tennessee area. The purpose of monitoring is to improve and maintain ambient air quality and protect the people in Shelby County from exposure to unhealthy air. The ambient air monitoring network is operated in accordance with the United States Code of Federal Regulations (CFR), which requires a Network Assessment every five years to ensure that criteria pollutants are measured in important locations and that

monitoring resources are used in the most effective and efficient manner to meet the needs of multiple stakeholders.

Network assessment identifies new data needs and associated technologies, find opportunities for consolidation of individual sites into multi-pollutant sites, and identify geographic areas where network coverage should be increased or decreased based on changes in the population and/or emissions. The EPA requires that local agencies perform an assessment of the air quality system to determine, at a minimum, if the network meets the monitoring objectives defined in the 40 Code of Federal Regulations Part 58 Section 10, Appendix D. This includes whether new monitoring sites are required, whether existing sites are no longer needed and can be terminated, whether the network sufficiently supports characterization of air quality in areas with large populations of susceptible individuals, whether the siting criteria are satisfied, and whether new technologies are appropriate for incorporation into the air monitoring network. This report describes the assessment of the Ambient Air Monitoring Network operated by the SCHD AMB and fulfills the requirements for a periodic network review as listed in 40 CFR Part 58 Section 10. The regulations require that the report be submitted to the EPA by July 1, 2020.

2.2 Monitoring Objectives

In general, air monitoring networks must be designed to meet three basic monitoring objectives according to 40 CFR Part 58 Appendix D. First, they must provide air pollution data to the public in a timely manner. Second, they must support compliance with national ambient air quality standards (NAAQS) and emissions strategy development. Third, they must support air pollution research studies on assessment of health effects.

The two more specific Monitoring Objectives defined in Shelby County are:

- ***Highest Concentration*** - monitoring is conducted at sites to determine the highest concentration of an air pollutant in an area within the monitoring network. A monitoring network may have multiple high concentration sites. The Shelby County sites that operate under this objective are Alabama and Near Road monitoring stations.
- ***Population Exposure*** - monitoring is conducted to represent the exposed populated area to the air pollutant concentrations. The Shelby County sites that operate under this objective are Frayser, Alabama, and the Shelby Farms NCore stations.

2.3 Site Types

To support the three basic air monitoring objectives, a network must be designed to monitor the peak air pollution levels, monitor typical levels in populated areas, monitor air pollution transported into a city or region, and monitor air pollution levels near specific sources. Here is a listing of six general site types:

- Determine the highest concentrations in the network covered area.
- Measure typical concentrations in populated area.
- Determine the impact of significant sources or source categories on air quality.
- Determine general background concentration levels.

- Determine the extent of air pollution transport and in support of secondary standards.
- Measure air pollution impacts on welfare (such as visibility, vegetation damage).

From the data collection purpose, the national ambient air monitoring system has 4 types of monitoring stations.

- Research Grade Stations – platforms for scientific studies, either involved with health or welfare impacts, measurement methods development, or other atmospheric studies.
- NCore Multi-pollutant Stations – sites that measure multiple pollutants in order to provide support to integrated air quality management data needs.
- State and Local Air Monitoring Stations (SLAMS) – sites intended to address specific air quality management interest.
- Special Purpose Monitoring (SPM) Stations – short-term monitoring station for criteria pollutants or longer-term monitoring station for non-criteria pollutants or non-federal reference method (FRM)/non-federal equivalent method (FEM).

2.4 Spatial Scales

The goal in locating monitors is to correctly match the spatial scale represented by the sample of monitored air with the spatial scale most appropriate for the monitoring site type, air pollutant to be measured, and the monitoring objective. The spatial scale of representativeness is described in terms of the physical dimensions of the air parcel nearest to a monitoring site throughout which actual pollutant concentrations are similar.

The representative measurement scales of the greatest interest for the monitoring site types are shown below:

Micro	0 - 100-meter diameter
Middle	100 – 500-meter diameter
Neighborhood	0.5 – 4-kilometer diameter
Urban	4 – 50-kilometer diameter
Regional	Ten to hundreds of kilometer diameter
National/Global	The nation and the globe as a whole

Proper siting of a monitor is a combinational consideration of monitoring objective, the types of sites necessary to meet the objective, and the spatial scale of representativeness.

2.5 Correlation Analysis

The EPA provided tools to assist in the network assessment process. The NetAssess2025 was used to assist with data correlation, service area, design value trend and pollutant exceedance probability within a Core Based Statistical Area (CBSA) or a region. The correlation values between sites quantitatively describe the degree of relatedness between the measurements made at two sites. The correlation values, however, may indicate whether a pair of sites is related, but it does not indicate if one site consistently measures pollutant concentrations at levels substantially higher or lower than the other.

2.6 Minimum Numbers of Monitors

As a general requirement, the EPA specifies the minimum numbers of sites required in a criteria pollutant network based on the latest census population data and the measured pollutant data. For instance, the minimum number of ozone sites required is based upon the CBSA population and the most recent 3-year design value. There were no minimum requirements for the numbers of CO, NO₂, and SO₂ monitors in an air monitoring network, other than the ones required for NCore. There are minimum requirements and the total number of sites necessary to adequately satisfy all monitoring objectives may be higher. Discontinuing operations within existing monitoring networks, even if not required by regulation, is usually subject to approval by the EPA Regional administrator.

3. Population of Memphis TN-AR-MS CBSA

Although the EPA has recognized the Memphis TN-AR-MS CBSA to consist of Shelby, Fayette, and Tipton counties in TN, Crittenden County, AR, and DeSoto, Marshall, Tate, and Tunica counties in MS, only three counties contain air pollution monitoring sites (Shelby County, TN, Crittenden County, AR, and Desoto County, MS). The total population of these three counties is slightly more than 1.16 million. The total population of the Memphis TN-AR-MS CBSA is about 1.34 million. The 2020 census population and estimates for these counties are summarized in Table 2. Figures 1-3 shows the estimated populations of the three counties from 2020 to 2024 and their variation trends.

The mean absolute difference between two sites is an indicator of the overall measurement similarity between the two sites. Site pairs with a lower difference are more like each other than pairs with a larger difference. Usually, sites with a larger distance between them will generally be more poorly correlated and have large differences in the corresponding pollutant concentrations. The distance between site pairs in the correlation matrix is displayed in kilometers. The purpose of this tool is to provide a means of identifying potential redundant sites that could be removed. Potentially redundant sites exhibit fairly high correlations of 0.8 consistently across all their pairings and have low average relative difference, despite the

distance between it and other sites. Usually, it is expected that correlation between sites will decrease as distance increase. However, for regional air pollutants such as ozone, sites in the same air shed can have very similar concentrations and be highly correlated. More unique sites will tend to exhibit the opposite characteristics. They will not be very well correlated with other sites, and their relative difference would be higher than other site-to-site pairs.

Table 2. Estimated Population of Memphis CBSA

	2020	2021	2022	2023	2024
Shelby County, TN	929,744	929,744	923,255	916,371	910,530
DeSoto County, MS	185,314	188,633	191,723	193,247	195,871
Crittenden Co., AR	48,163	47,609	47,061	47,139	46,633
Fayette County, TN	41,990	42,074	42,567	42,653	44,476
Tipton County, TN	60,970	61,071	61,067	61,339	62,187
Marshall County, MS	33,753	33,752	34,110	34,123	34,374
Tate County, MS	28,064	28,123	28,094	28,135	28,551
Tunica County, MS	9,787	9,782	9,458	9,234	9,157
Total Memphis-TN-AR-MS¹	1,163,221	1,165,986	1,163,221	1,163,221	1,163,221
Total Memphis-TN-AR-MS CBSA	1,337,785	1,340,788	1,337,335	1,332,241	1,340,820

¹ Total population of the 3 counties containing air pollution monitors (Shelby Co., TN-Crittenden County, AR-DeSoto County, MS)

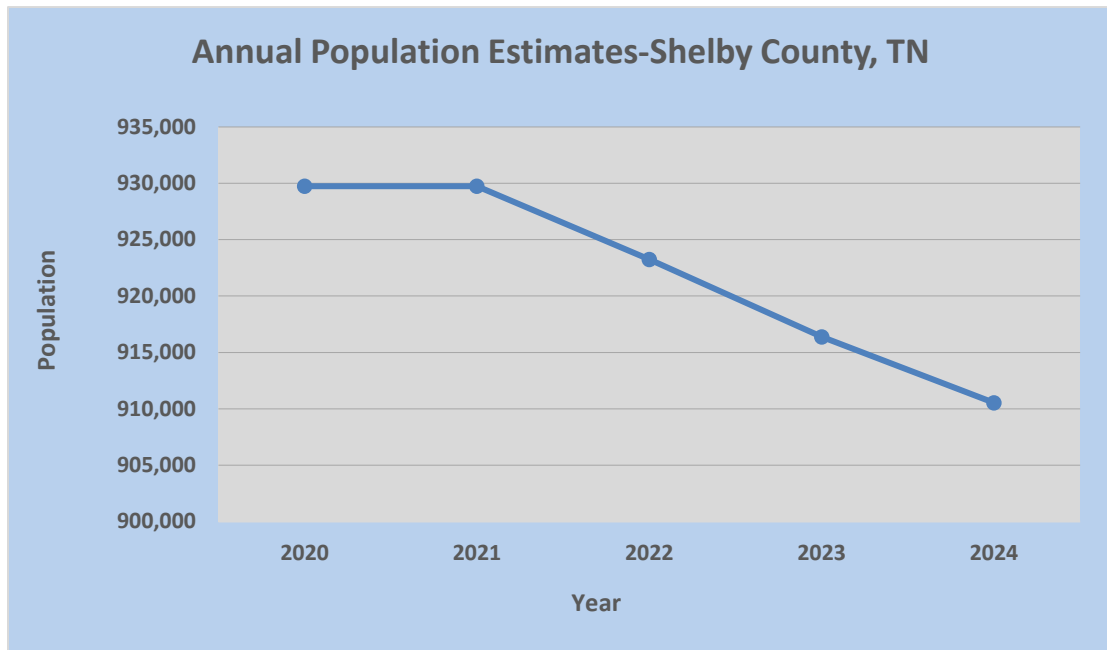


Figure 1. Annual Estimates of Resident Population in Shelby County from 2020 to 2024

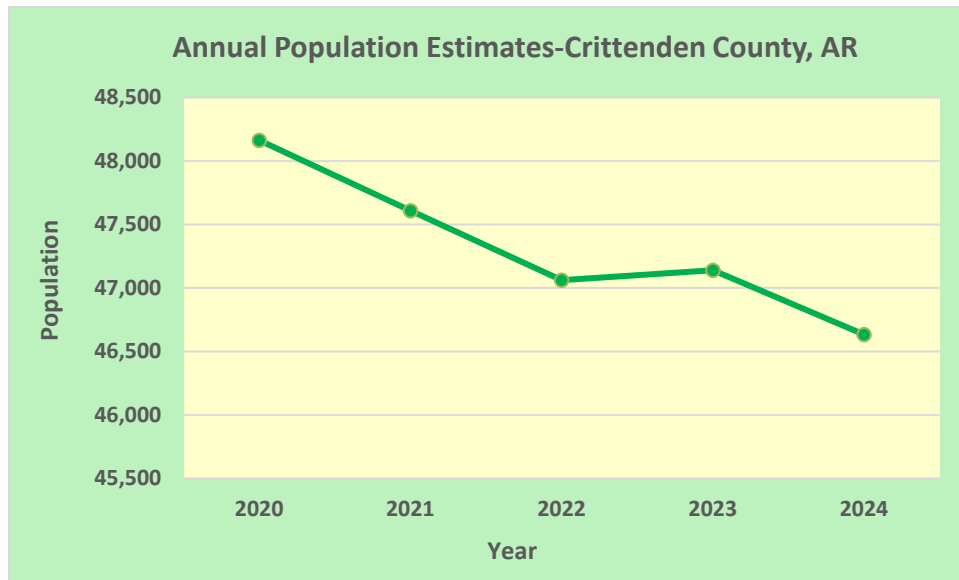


Figure 2. Annual Estimates of Resident Population in Crittenden County from 2020 to 2024

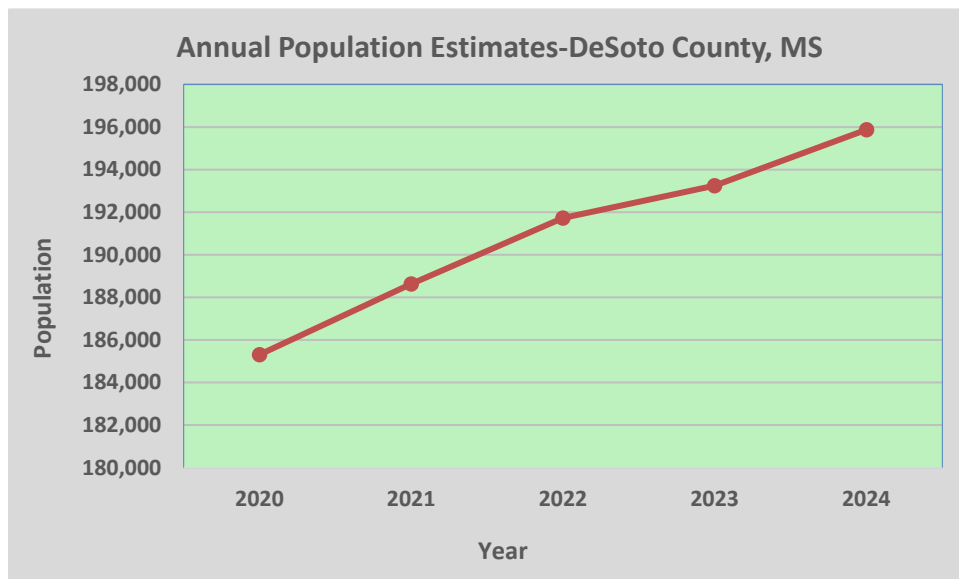


Figure 3. Annual Estimates of Resident Population in Desoto County from 2020 to 2024

Below are geographic maps focusing on susceptible individuals for the three counties that contain air pollution monitors for the Memphis TN-AR-MS CBSA.

Susceptible individuals in this assessment are defined as those < 5 years of age and > 65 years of age. Figures 4-9 display the population densities of people under the age of 5 and over the age of 65 in Shelby County and neighboring areas.

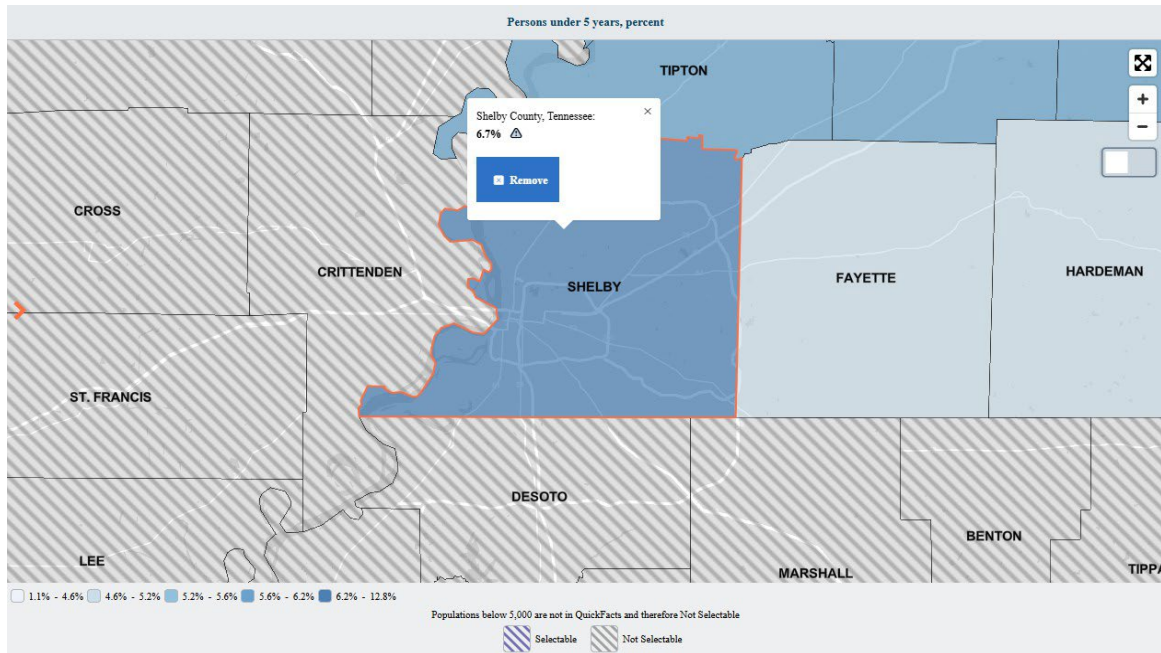


Figure 4. Geographic Map of Shelby County and Estimated Percentage of People under the age of 5 in 2024

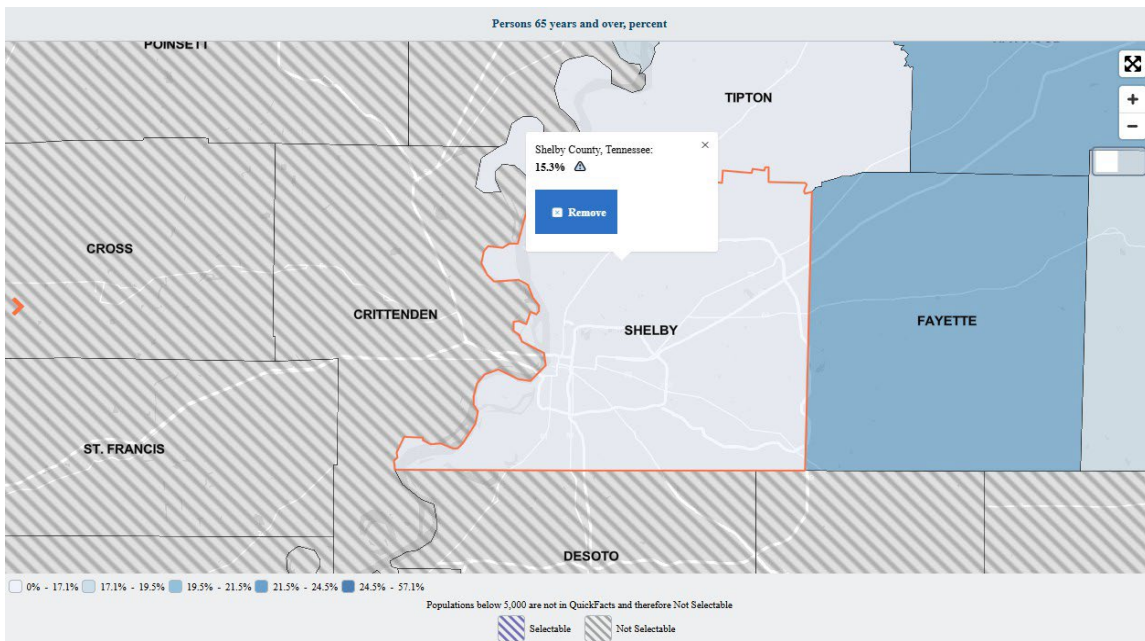


Figure 5. Geographic Map of Shelby County and Estimated Percentage of People over the age of 65 in 2024

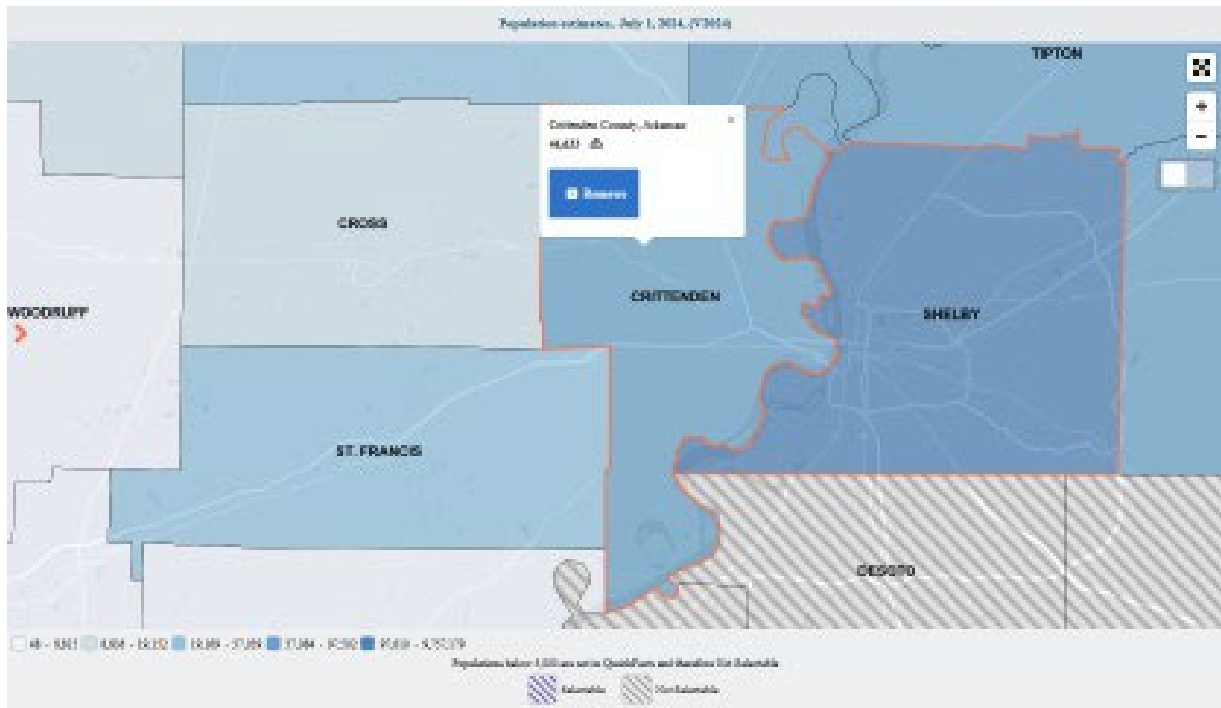


Figure 6. Geographic Map of Crittenden County and Estimated Percentage of People under the age of 5 in 2024

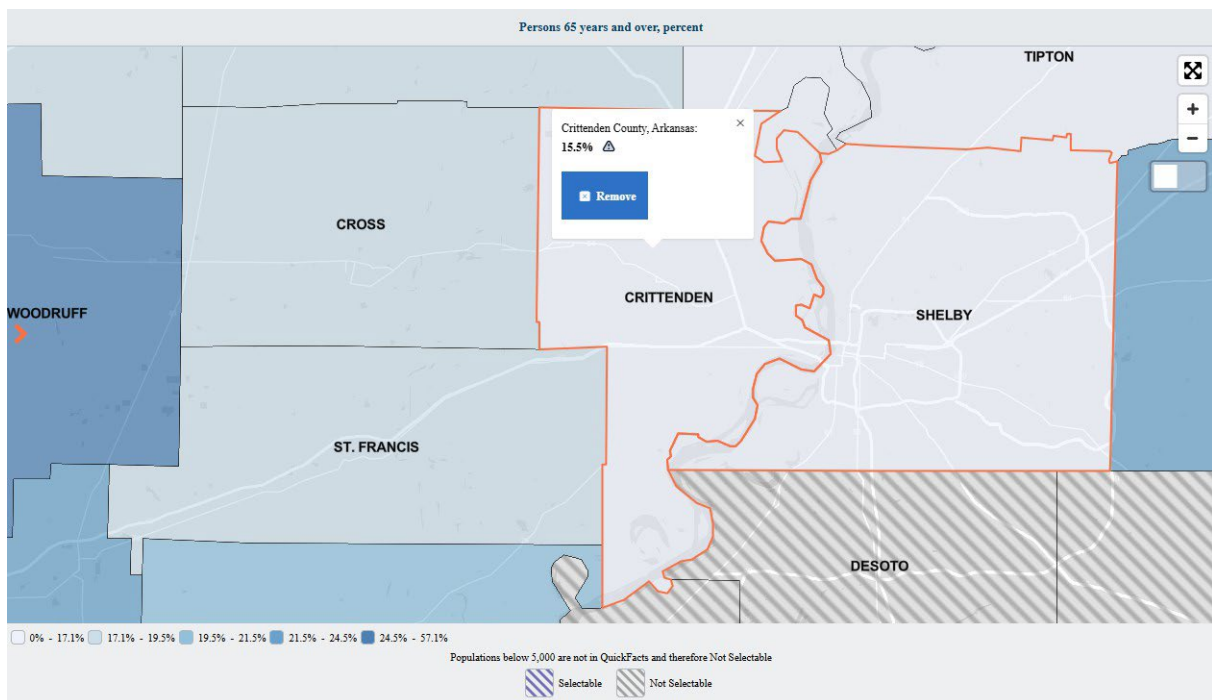


Figure 7. Geographic Map of Crittenden County and Estimated Percentage of People over the age of 65 in 2024

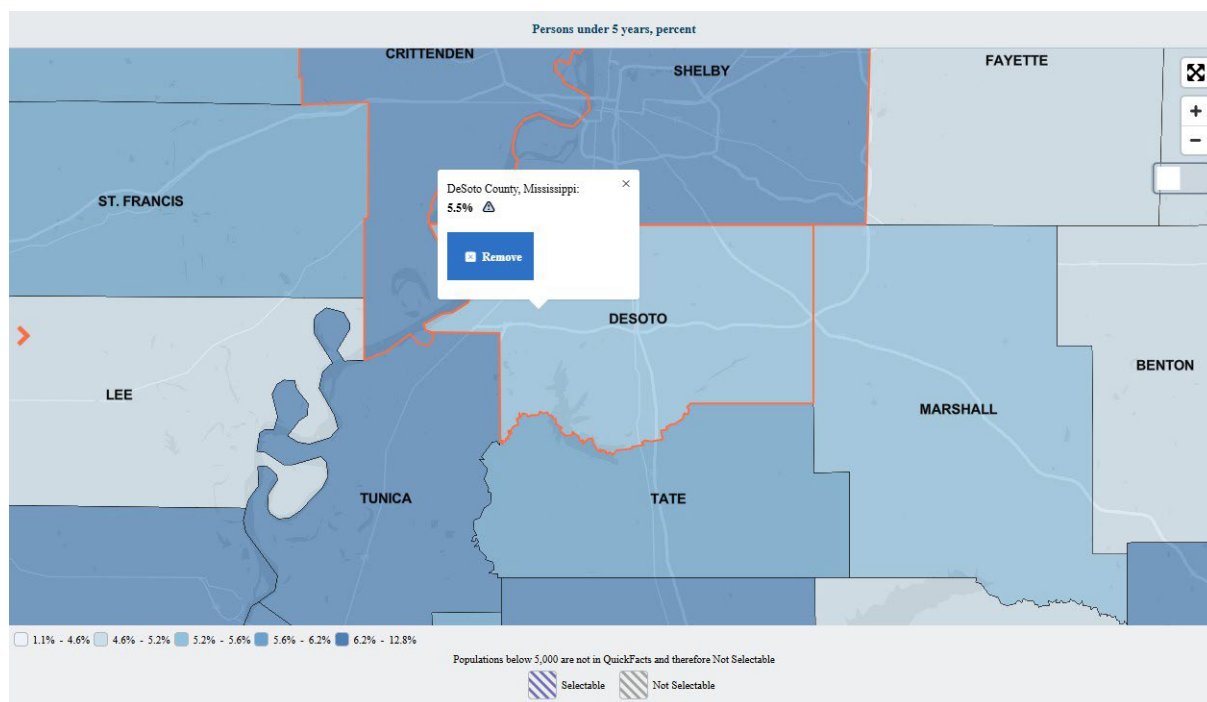


Figure 8. Geographic Map of Desoto County and Estimated Percentage of People under the age of 5 in 2024

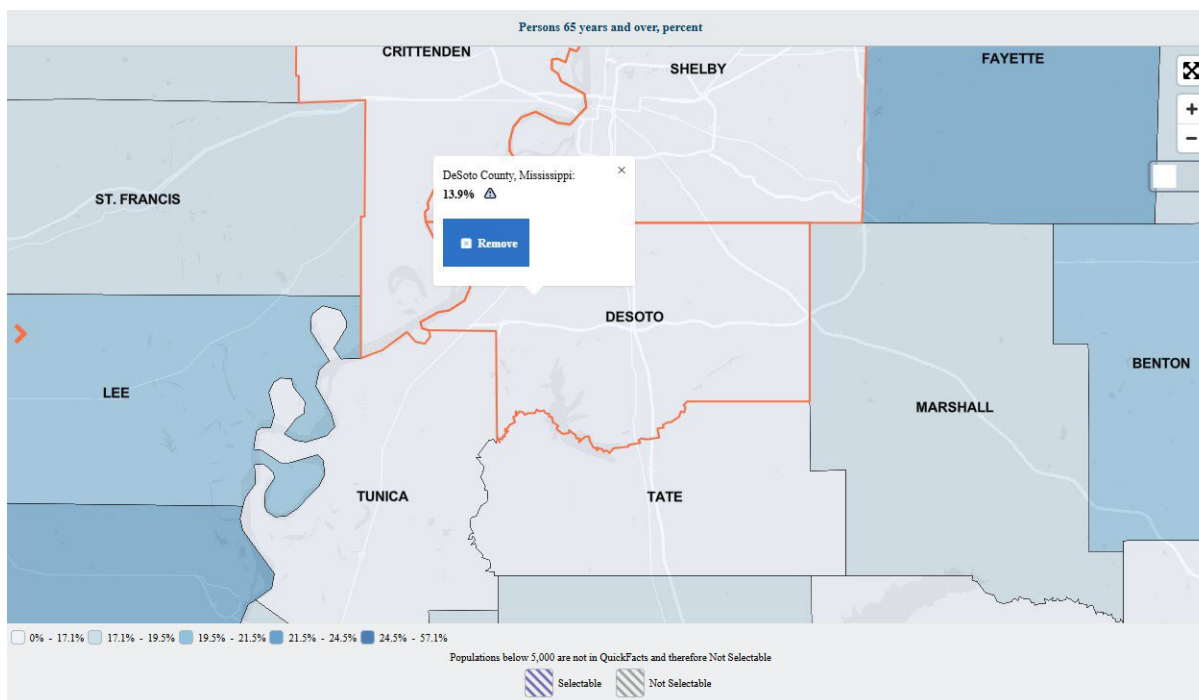


Figure 9. Geographic Map of Desoto County and Estimated Percentage of People over the age of 65 in 2024

4. Meteorological Conditions

Wind data from Jan.1, 2020 to Dec. 31, 2024 is shown in Figure 10 for the Memphis International Airport (MEM). Most of the time, the wind direction is from the south to southwest and the average wind speed (not including light and variable winds) is 6.89 knots (7.93 mph). Two ozone sites (47-157-1004 and 47-157-0021) are located downwind of the city of Memphis.

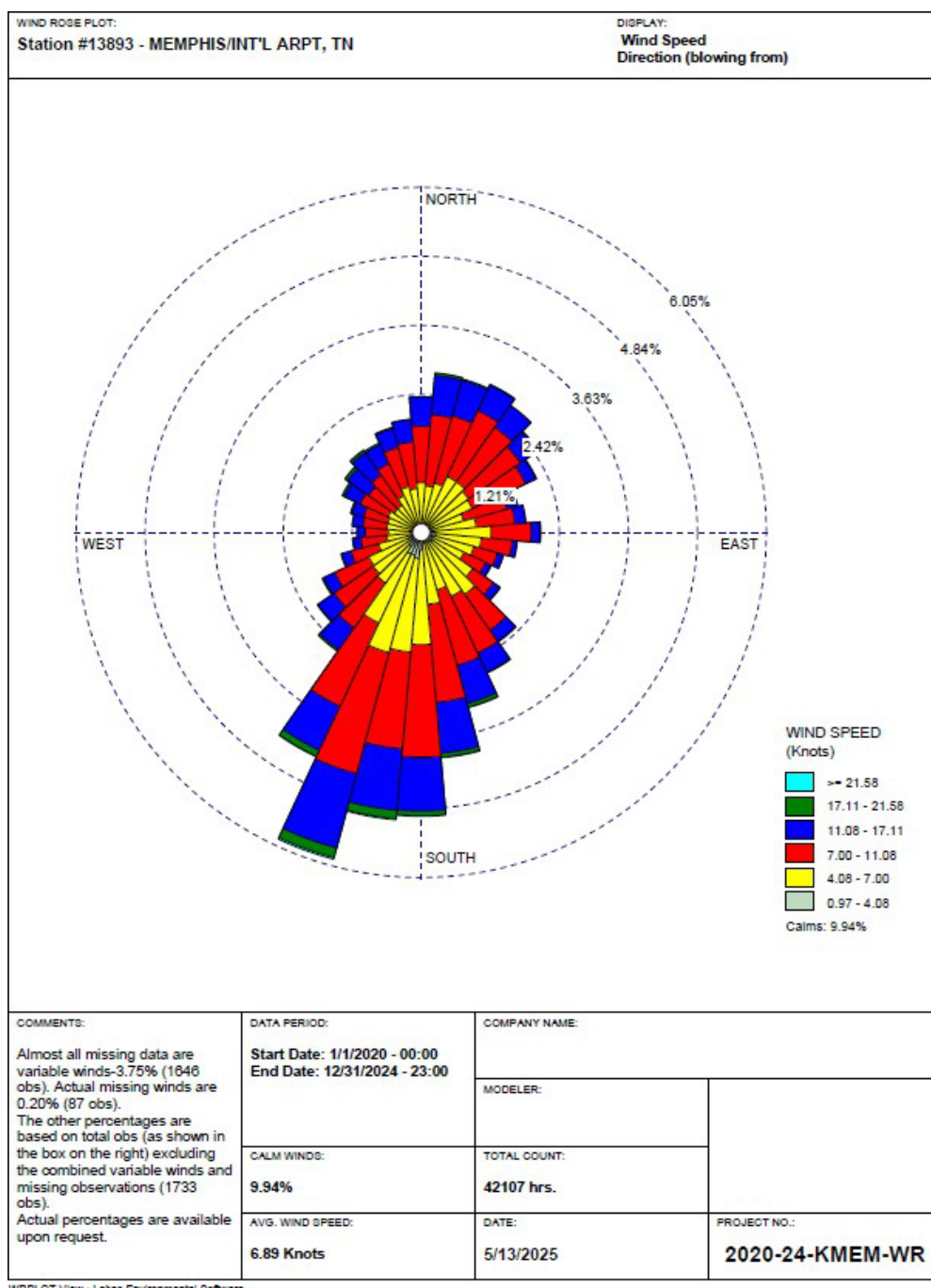


Figure 10. Wind Rose for Memphis International Airport from 2020 to 2024

The wind rose was produced using the WRPLOT View freeware software from Lakes Environmental Software.

5. Pollutant Network Assessment

The current SCHD ambient air monitoring network currently consists of five monitoring stations as shown in Figure 11 (yellow pins).

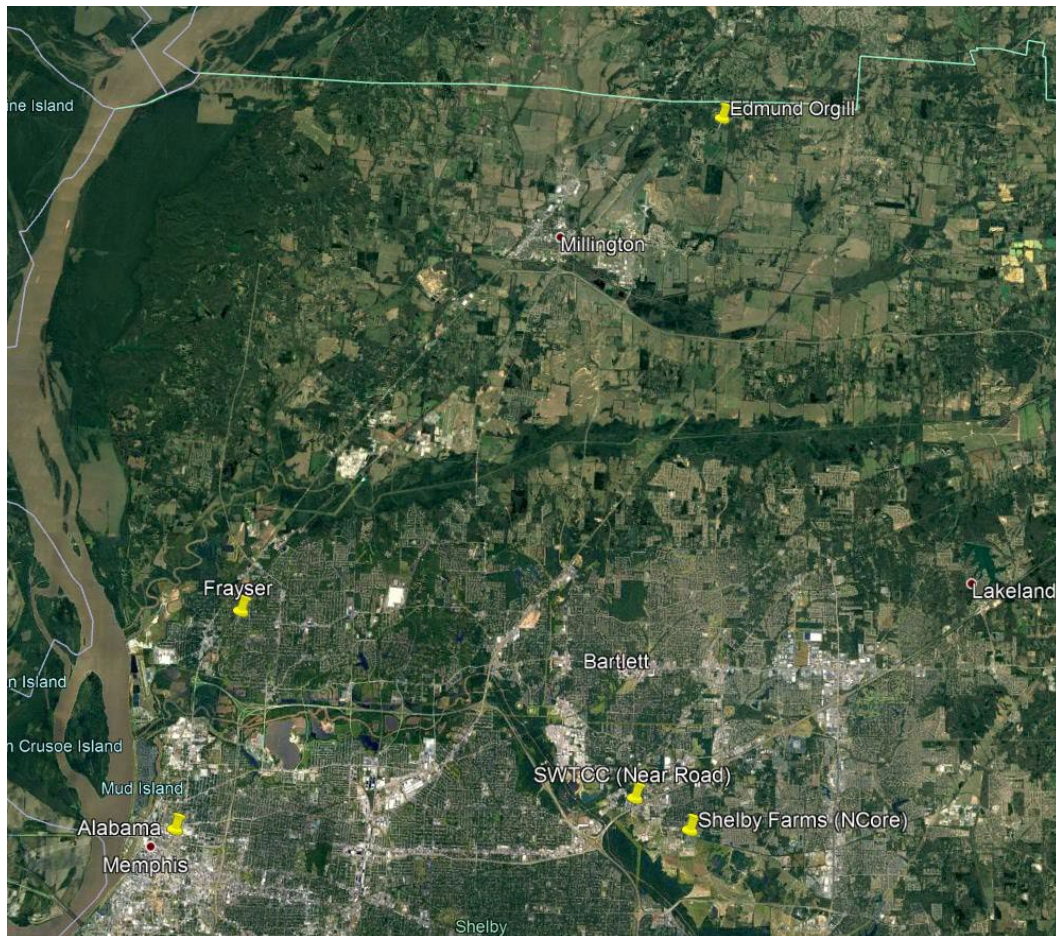


Figure 11. Geographic Map of current Shelby County Air Monitoring Sites

The Memphis CBSA currently consists of 7 monitoring sites as shown in Figure 12. One is in Crittenden County Arkansas (red pin), and one is in Desoto County Mississippi (green pin).

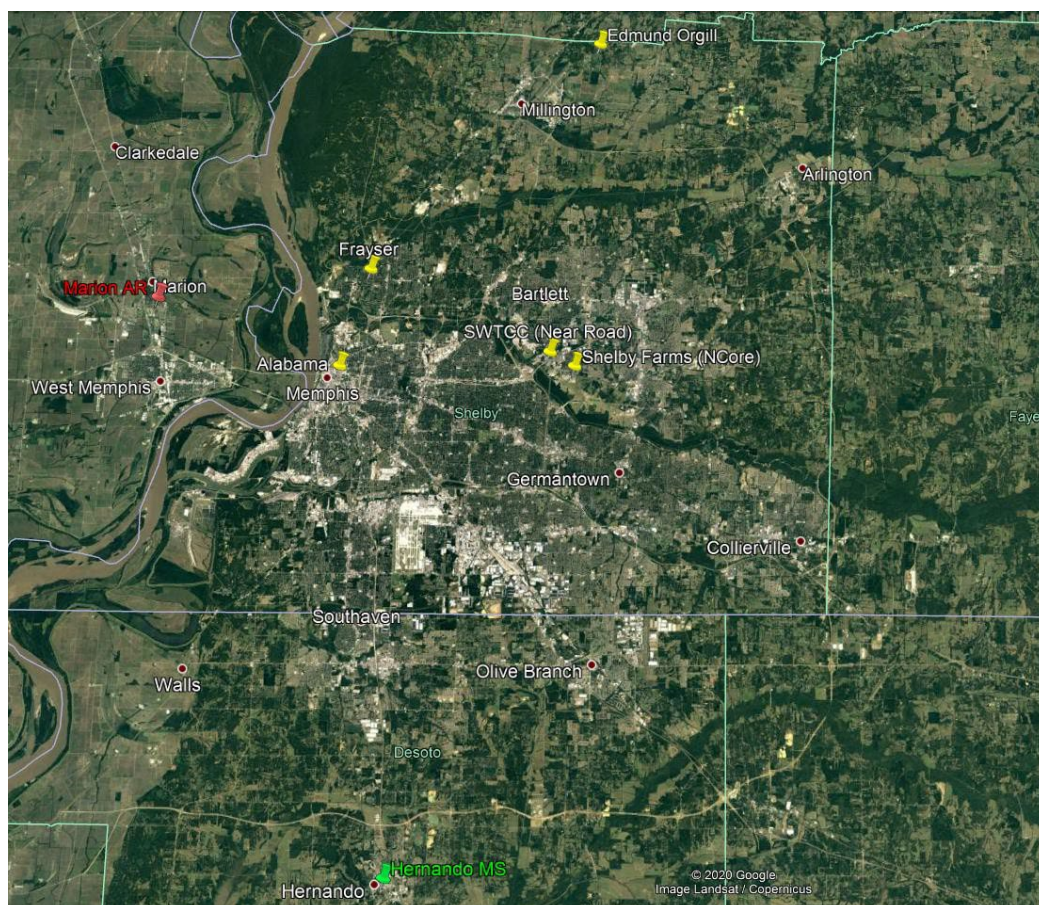


Figure 12. Geographic Map of current Memphis CBSA Air Monitoring Sites

These seven sites consist of one NCore site, one Near Road site and 5 other criteria pollutants sites. The five monitoring sites in the Shelby County area are described in Table 1. The information on Hernando and Marion sites are summarized in Table 3.

Table 3. Correlated Air Monitoring sites in Desoto County, MS and Crittenden County, AR

Site	AQS ID	O ₃	NO ₂	CO	SO ₂	PM _{2.5}	PM ₁₀
Hernando	28-033-0002	X				X	
Marion	05-035-0005	X	X			X	

In the following sections, each specific criteria pollutant in the SCHD monitoring network will be assessed based on the requirements of 40 CFR Part 58 Appendix D.

The EPA has set National Ambient Air Quality Standards (NAAQS) for six principal pollutants, which are called "[criteria](#)" [air pollutants](#). Their current standards are listed below. Units of measure for the standards are parts per million (ppm) by volume, parts per billion (ppb) by volume, and micrograms per cubic meter of air ($\mu\text{g}/\text{m}^3$).

Table 4. Criteria Pollutants and NAAQS

Pollutant		Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide (CO)		primary	8 hours	9 ppm	Not to be exceeded more than once per year
			1 hour	35 ppm	
Lead (Pb)		primary and secondary	Rolling 3 month average	0.15 $\mu\text{g}/\text{m}^3$ (1)	Not to be exceeded
Nitrogen Dioxide (NO₂)		primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		primary and secondary	1 year	53 ppb (2)	Annual Mean
Ozone (O₃)		primary and secondary	8 hours	0.070 ppm (3)	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particle Pollution (PM)	PM _{2.5}	primary	1 year	9.0 $\mu\text{g}/\text{m}^3$	annual mean, averaged over 3 years
		secondary	1 year	15.0 $\mu\text{g}/\text{m}^3$	annual mean, averaged over 3 years
		primary and secondary	24 hours	35 $\mu\text{g}/\text{m}^3$	98th percentile, averaged over 3 years
	PM ₁₀	primary and secondary	24 hours	150 $\mu\text{g}/\text{m}^3$	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO₂)		primary	1 hour	75 ppb (4)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	3 hours	10 ppb	Not to be exceeded more than once per year

(1) In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 $\mu\text{g}/\text{m}^3$ as a calendar quarter average) also remain in effect.

(2) The level of the annual NO₂ standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.

(3) Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O₃ standards additionally remain in effect in some areas. Revocation of the previous (2008) O₃ standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.

(4) The previous SO₂ standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2) any area for which an implementation plan providing for attainment of the current (2010) standard has not been submitted and approved and which is designated nonattainment under the previous SO₂ standards or is

not meeting the requirements of a SIP call under the previous SO₂ standards (40 CFR 50.4(3)). A SIP call is an EPA action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the required NAAQS.

(5) **Primary standards** provide public health protection, including protecting the health of "sensitive" populations such as asthmatics, children, and the elderly. **Secondary standards** provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

5.1 Ozone Monitoring Network

The minimum ozone monitoring requirements are listed in Table 5 which is reproduced from Table D-2 of 40 CFR Part 58 Appendix D.

Table 5. SLAMS Minimum Ozone (O₃) Monitoring Requirements

CBSA Population	Most recent 3-year design value concentrations $\geq 85\%$ of any O ₃ NAAQS	Most recent 3-year design value concentrations $< 85\%$ of any O ₃ NAAQS
>10 Million	4	2
4-10 Million	3	1
350,000-<4 Million	2	1
50,000-350,000	1	0

The number of sites required in the network is based on the Memphis CBSA population and design values. Table 6 shows the 2024 ozone 8-hour design values.

Table 6. 2024 Ozone Design Values in Memphis TN-AR-MS CBSA

<u>Site Name</u>	<u>AQS ID</u>	<u>County</u>	<u>2024 Design Value</u>
Shelby Farms (NCore)	47-157-0075	Shelby, TN	0.073 ppm
Edmund Orgill	47-157-1004	Shelby, TN	0.068 ppm
Frayser	47-157-0021	Shelby, TN	0.071 ppm
Hernando	28-033-0002	Desoto, MS	0.071 ppm
Marion	05-035-0005	Crittenden, AR	0.072 ppm

The most recent 8-hour design value for the CBSA is 0.073 ppm, which is larger than 85% of 8-hour NAAQS (0.070 ppm), the minimum number of required monitoring sites for the Memphis CBSA is two. Currently, this CBSA has five ozone monitoring sites, and three active ozone monitoring sites are in Shelby County.

Ozone forms more readily during warmer times of the year. In Shelby County, Tennessee, the ozone season starts from March 1st and ends on October 31 each year. The Shelby Farms site monitors ozone year-round as this schedule is a requirement for all NCore stations.

5.1.1 Monitoring Objective Compliance with 40 CFR Part 58 Appendix D

(a) Provide valid ozone data to the public in a timely manner:

The SCHD AMB monitoring network collects data from three ozone monitoring sites. Data is downloaded every hour by TCP/IP connections to the data management system Air Vision.

The SCHD ozone data is uploaded hourly to the USEPA AirNow website (www.AirNow.gov). The ozone data will be uploaded to the USEPA Air Quality System (AQS) quarterly after it is validated.

(b) Support compliance with the National Ambient Air Quality Standards (NAAQS):

Data from the SCHD AMB ozone monitoring network complies with applicable siting requirements and is available for NAAQS compliance determination and may be used for emissions strategy development. Data from the ozone monitoring sites operated by the SCHD AMB may be used in the development of attainment and maintenance plans. Data from the NCore site (47-157-0075) is available for use in the evaluation of regional air quality models used in developing emission strategies and may be used to track trends of air quality.

(c) Support for air pollution research studies:

The NCore site may be used to supplement data collected by researchers working on health effects assessments and atmospheric processes, or for monitoring methods development.

5.1.2 Support for Susceptible Individuals

Figures 13-17 show the demographics of the areas served by each ozone site. All ozone stations are well sited in an area of high population density, especially high population of the very young (<5 years of age).

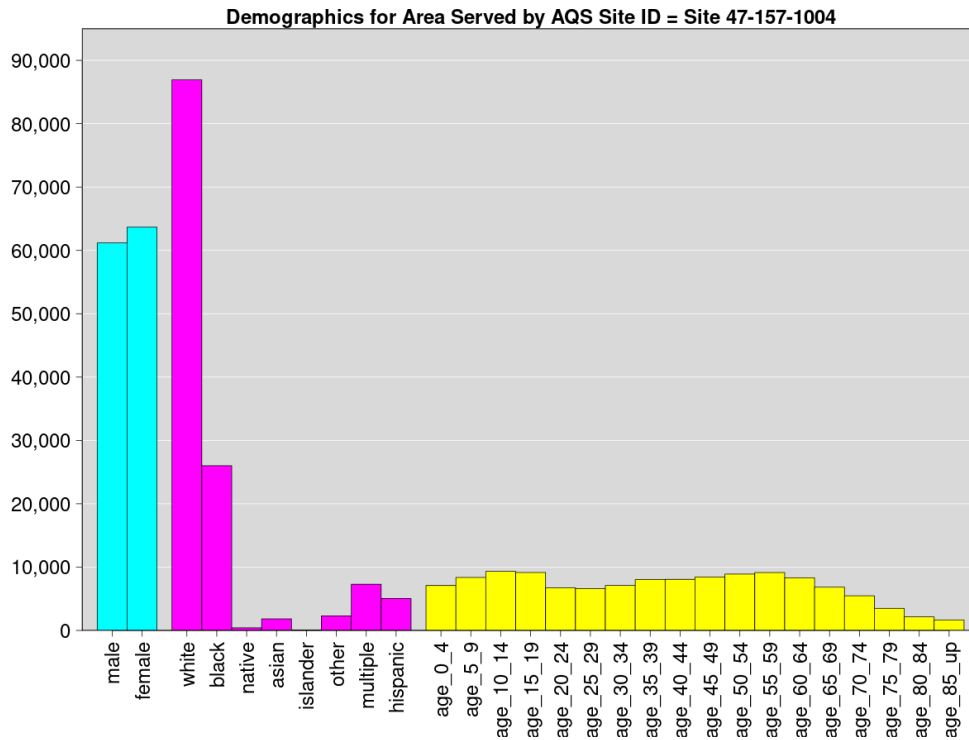


Figure 13. Demographics for area served by air monitoring site 47-157-1004 (Edmund Orgill Park). Graph is made using the NetAssess2025 tool.

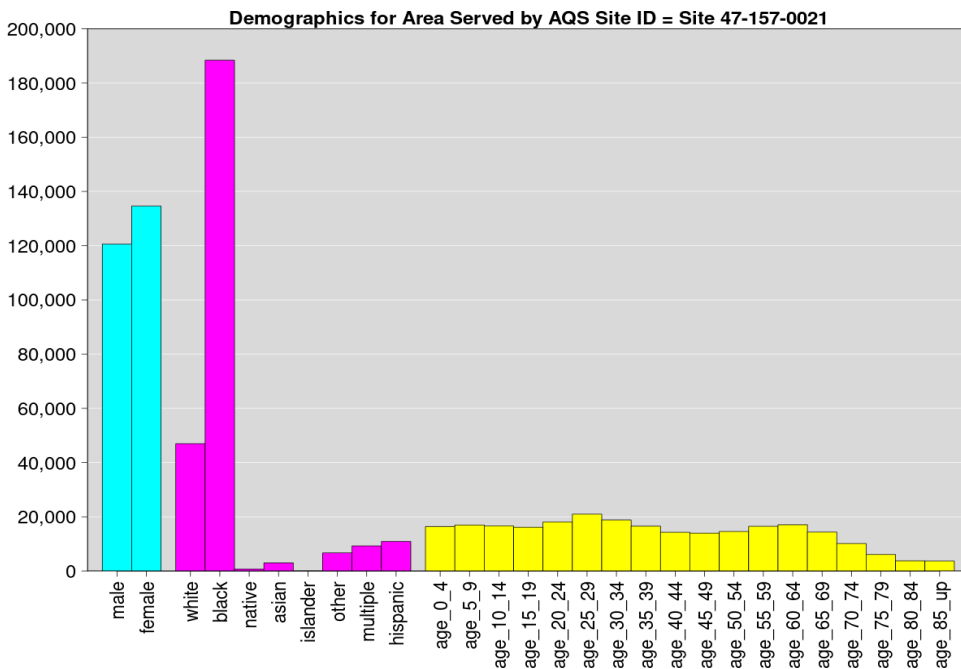


Figure 14. Demographics for area served by air monitoring site 47-157-0021 (Frayser). Graph is produced using the NetAssess2025 tool.

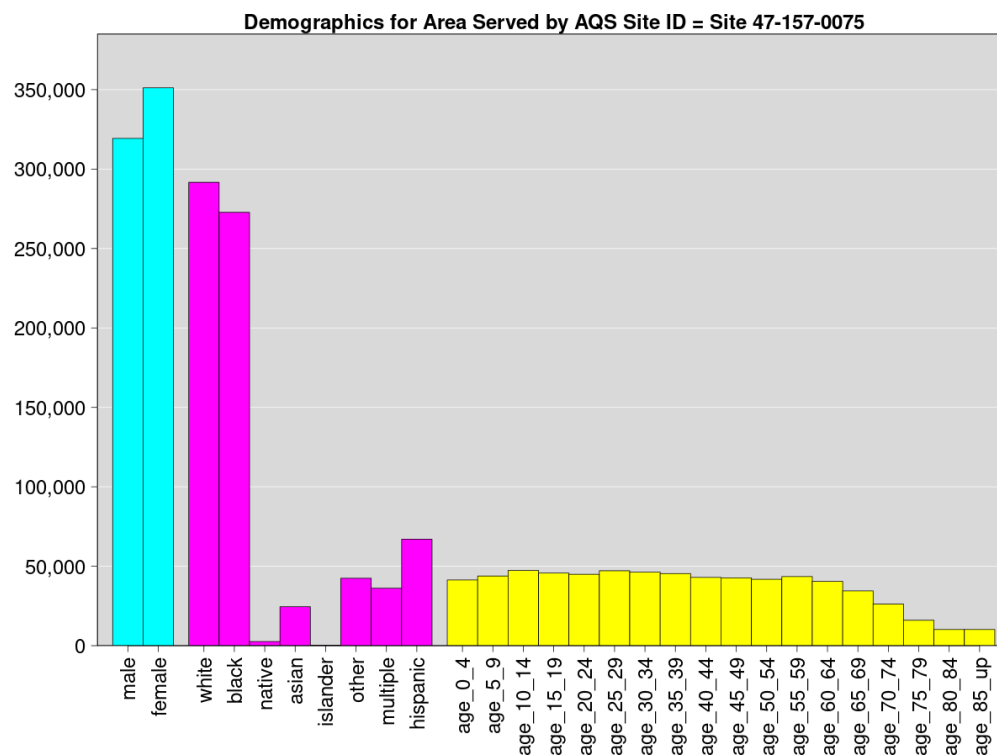


Figure 15. Demographics for area served by air monitoring site 47-157-0075 (Shelby Farms-NCore). Graph is produced using the NetAssess2025 tool.

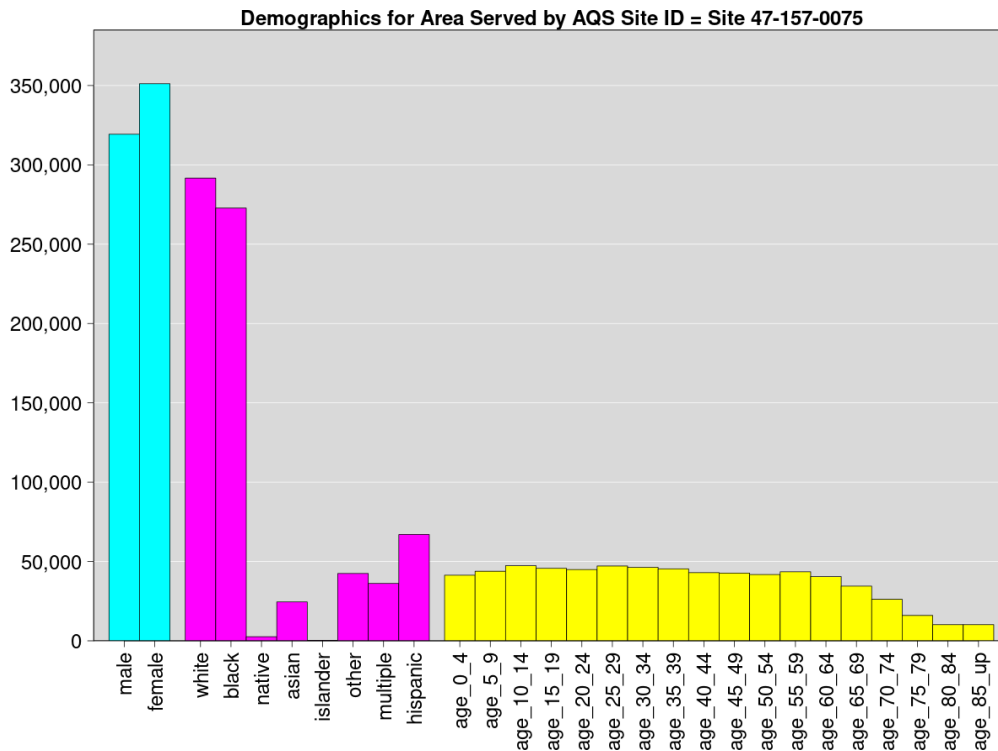


Figure 16. Demographics for area served by air monitoring site 28-033-0002. Graph is made with the NetAssess2025 tool.

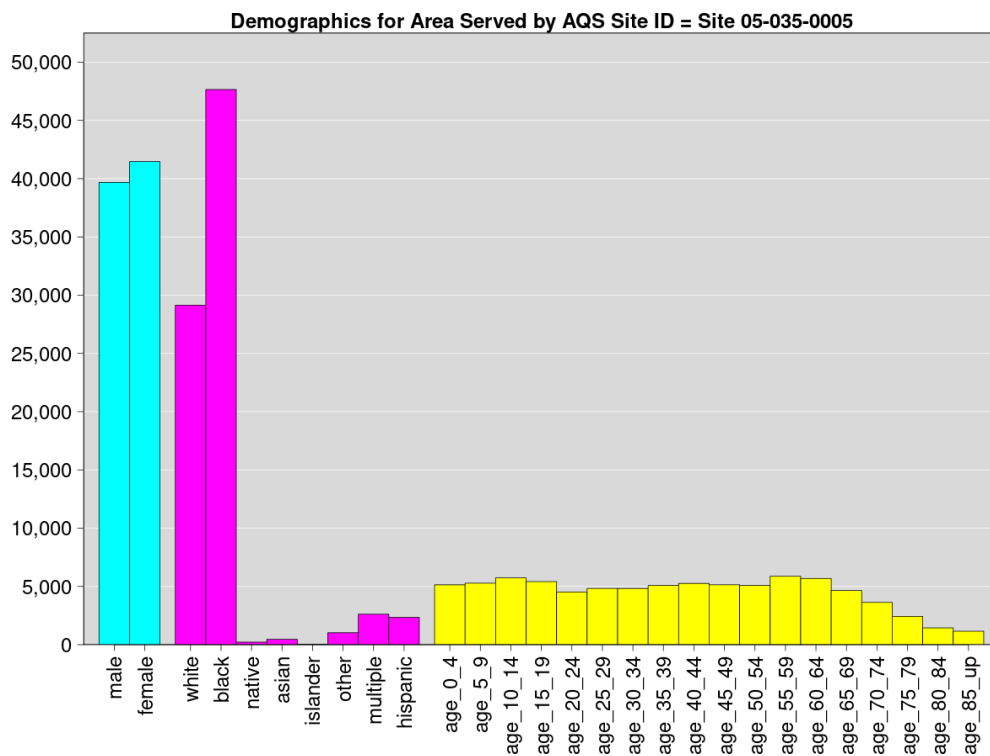


Figure 17. Demographics for area served by air monitoring site 05-035-0005. Graph is made with the NetAssess2025 tool.

5.1.3 Historical Data

Figures 18 through 22 show the decreasing trends of ozone design values at each ozone site of the Memphis CBSA through the years 2019-2020 depending on each site. Since approximately 2020, there has been an overall increase in ozone design value concentrations within the Memphis CBSA. In 2024, the highest design values measured at the SCHD AMB monitoring stations ranged between 0.068 ppm and 0.073 ppm. The years 2023-2024 are slightly above the NAAQS for some of the monitors.

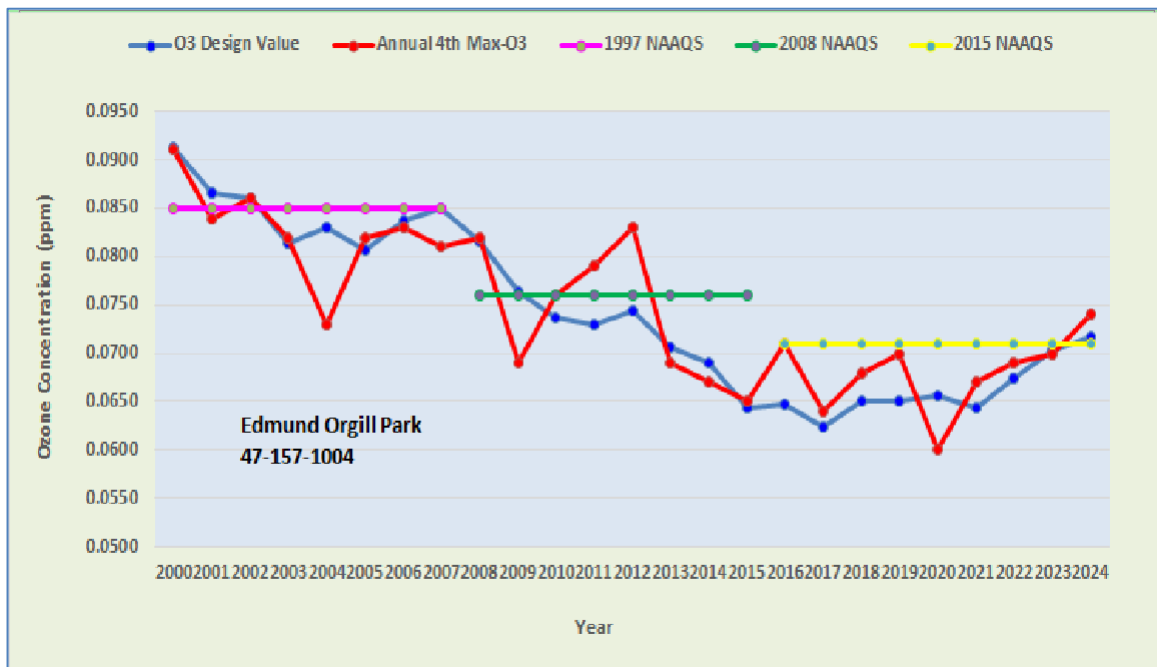


Figure 18. Annual 4th Maximum and Design Value Trends for Ozone at site 47-157-1004

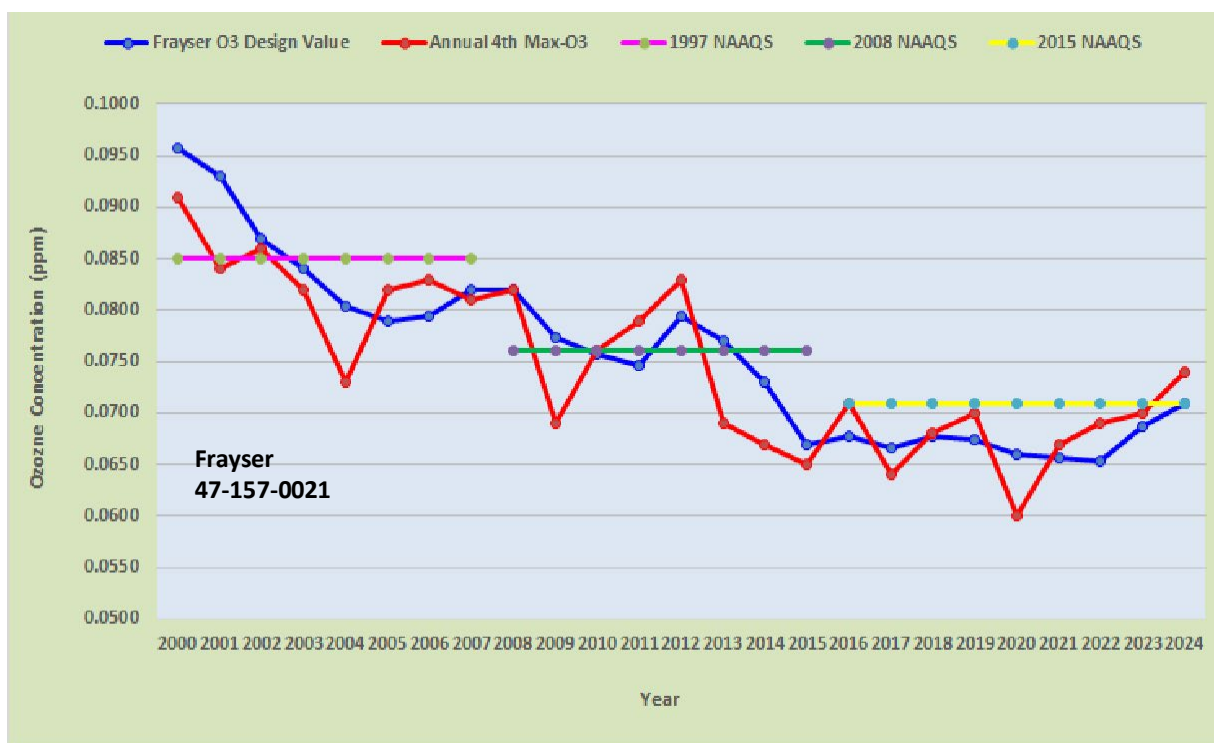


Figure 19. Annual 4th Maximum and Design Value Trends for Ozone at site 47-157-0021

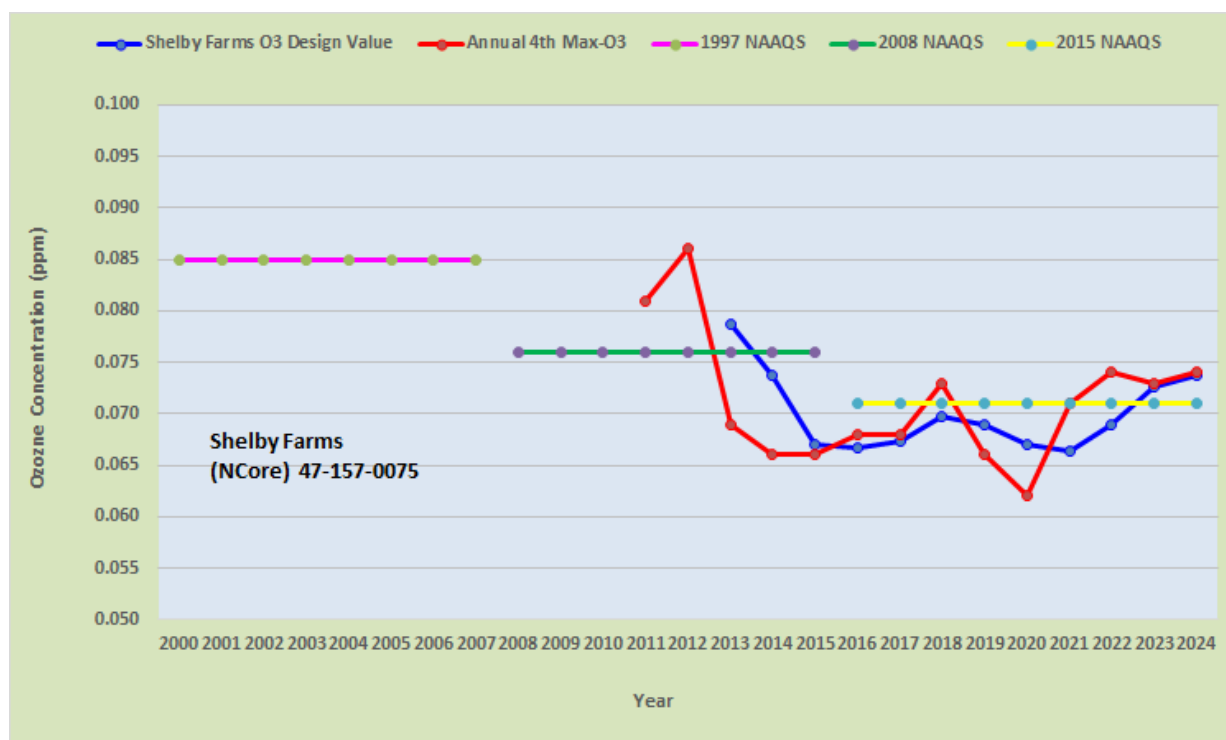


Figure 20. Annual 4th Maximum and Design Value Trends for Ozone at site 47-157-0075

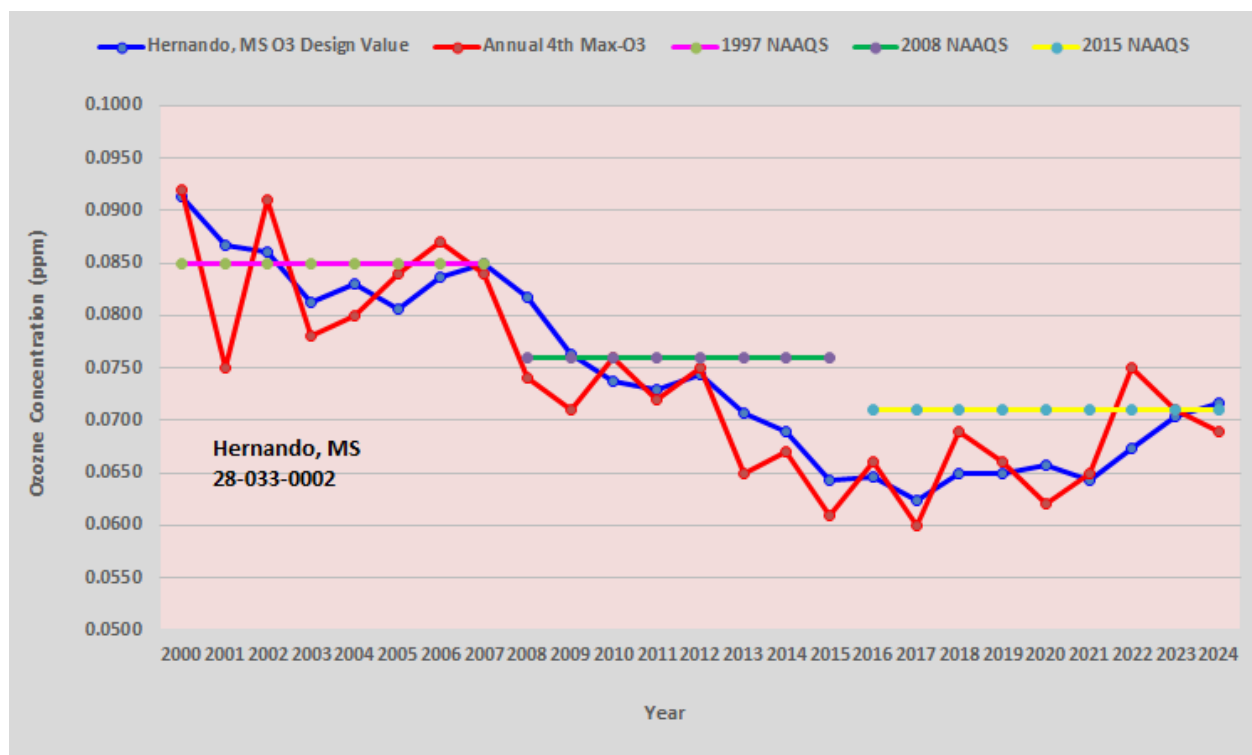


Figure 21. Annual 4th Maximum and Design Value Trends for Ozone at site 28-033-0002

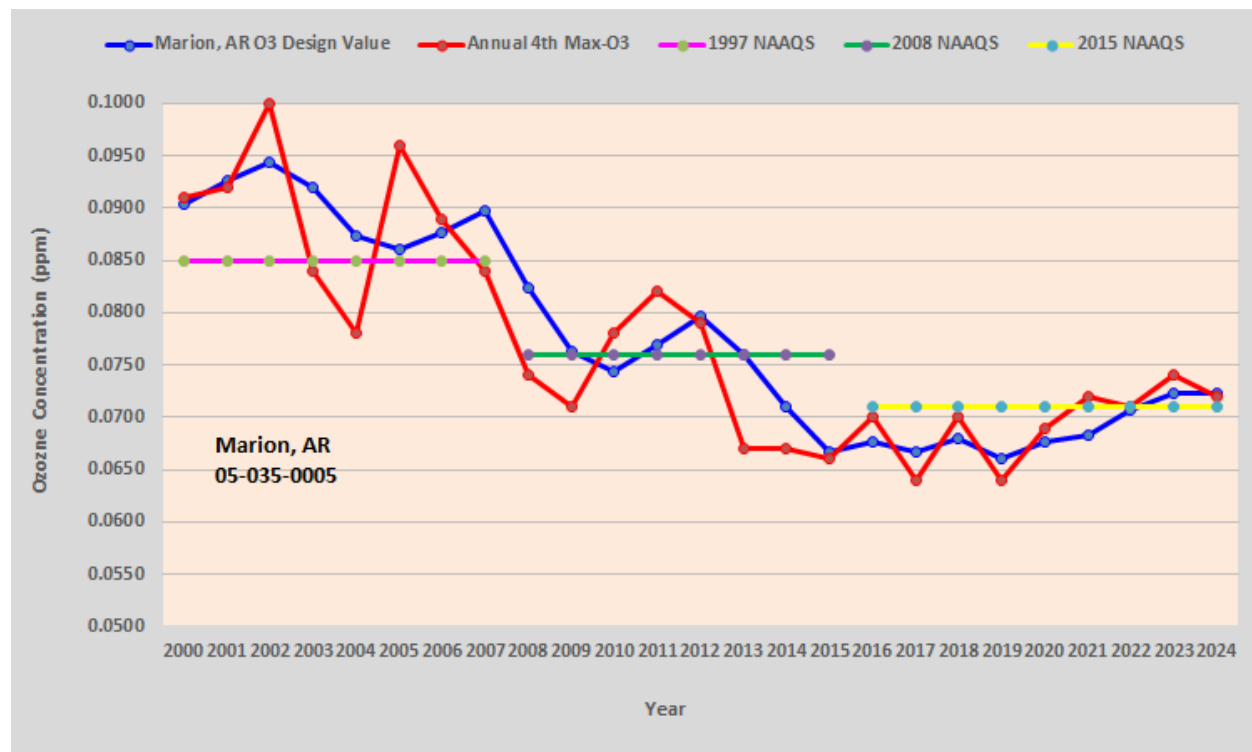


Figure 22. Annual 4th Maximum and Design Value Trends for Ozone at site 05-035-0005

5.1.4 Correlation Matrix Data for Memphis CBSA Ozone Sites

Five ozone monitoring stations are located within the Memphis CBSA. Three are within Shelby County. One site is in Crittenden County, AR and another site is in DeSoto County, MS. As shown in Figure 23, these five ozone sites serve different areas and together cover the Memphis CBSA. In the correlation matrix, the upper triangle numbers indicate the distance between the sites, the lower triangle numbers are the observation numbers used in the correlation. The numbers in the diagonal are the 2023 Ozone Design Values. The upper triangle colors indicate the mean absolute difference and the lower triangle colors indicate the Pearson Correlations. The background color indicates the exceedance probability from year 2019 to 2021.

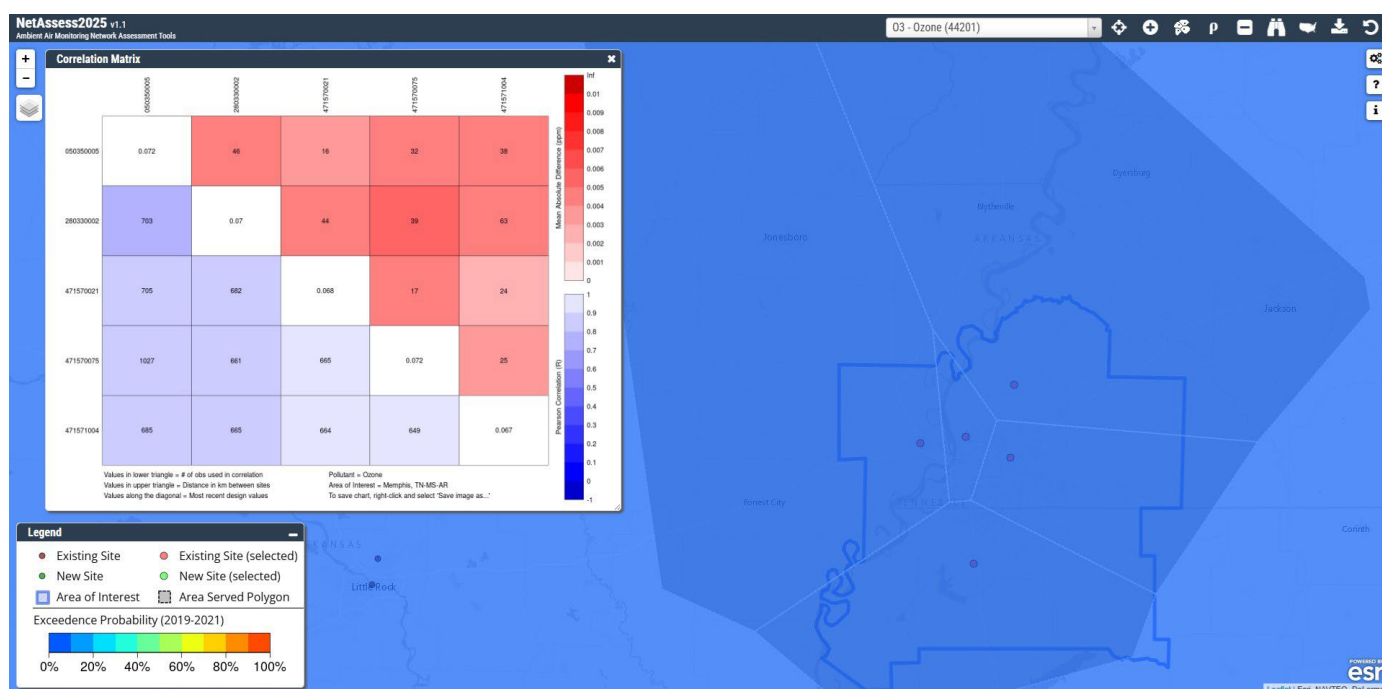


Figure 23. Memphis CBSA air monitoring ozone network correlation data. Graph is made with the NetAssess2025 tool.

5.1.5 2020 National Emissions Inventory for VOC in Shelby County

Figure 24 shows the location of VOC point sources in Shelby County using the 2017 NEI (2020 NEI map unavailable). Table 7 lists the emissions inventory (2020 NEI) of volatile organic compounds (VOCs). VOCs are important precursor compounds in the formation of ozone. Title V point sources are defined as sources with a potential to emit more than 100 tons per year of a regulated NAAQS pollutant, more than 10 tons per year of at least one hazardous air pollutant (HAP) or more than 25 tons per year of all HAPs combined. Note: At the time of this report, 2023 the NEI was not yet available.

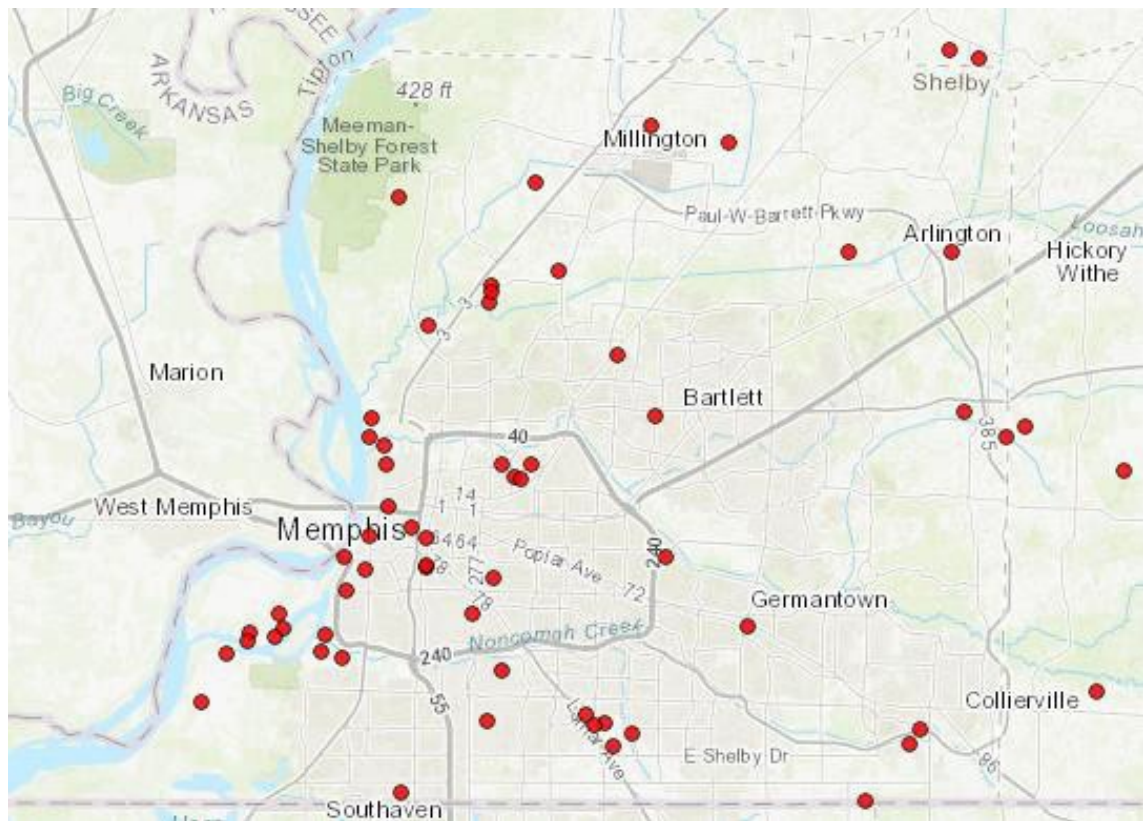


Figure 24. Map of facilities in Shelby County for 2017 VOC emissions (2020 map unavailable). Graph and chart data are extracted from the EPA 2020 NEI website.

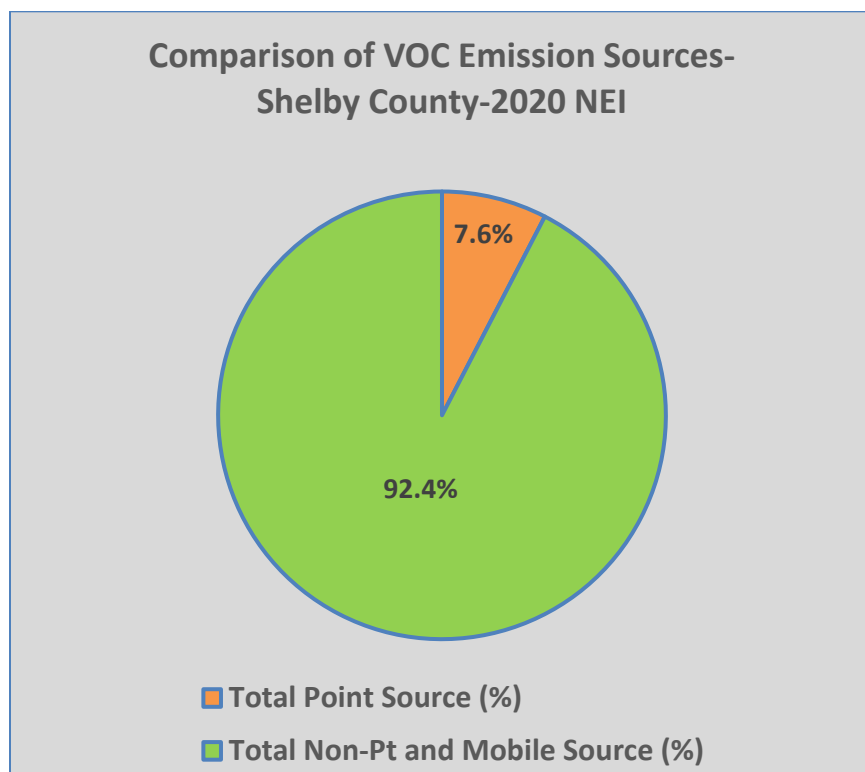


Figure 25. Percentage Comparison of Point Sources to Mobile/Non-Point Sources of VOC in Shelby County, Tennessee. Data compiled from EPA 2020 NEI.

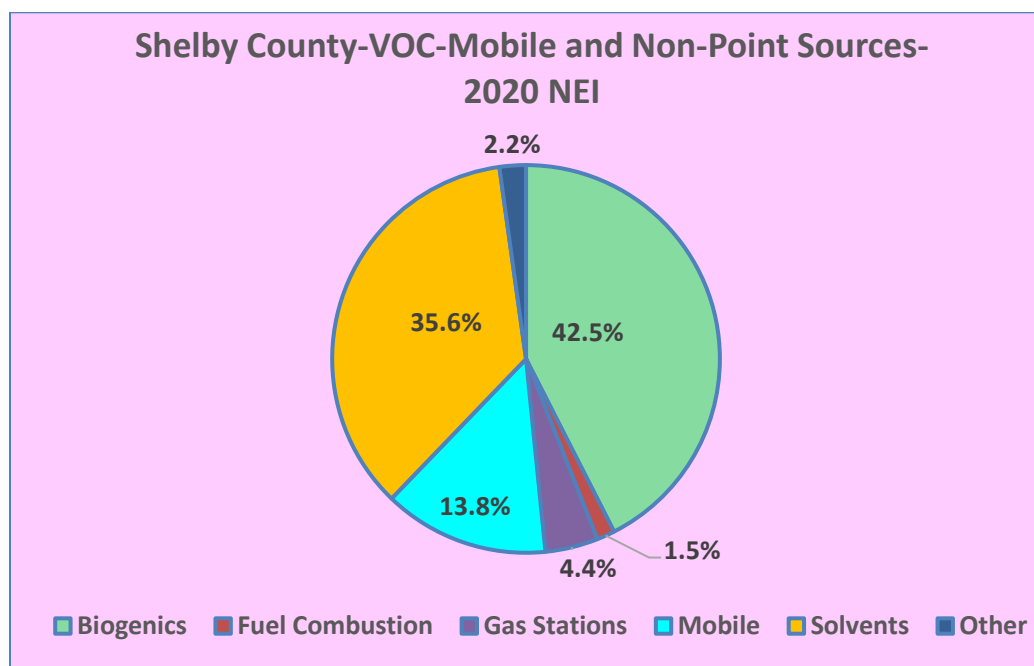


Figure 26. Percentage Comparison VOC Mobile/Non-Point Sources in Shelby County, Tennessee. Data compiled from EPA 2020 NEI.

Table 7. 2020 National Emissions Inventory for VOC

VOC Sources in Shelby County, TN	VOC Emissions (Tons/Yr)	EIS ID	Address	NAICS Code
Memphis International Airport	994.37445	9171111	2491 Winchester Rd	488119
Valero Refining Co.	562.29753	7156111	543 West Mallory Ave	32411
Cargill Corn Milling	215.05	5723011	2330 Buoy St	311221
Archer Daniels Midland Company (ADM)	192.26	6443711	2782 Chelsea Ave	311224
Sunoco Products Company	144.37	4965511	2755 Harbor Ave	332119
Blues City Brewery LLC	92.77001	4965611	5151 E. Raines Rd	31212
E I Dupont De Nemours & Company Inc.	83.2041	4963911	2751 Fite Rd	325180
AB Mauri Food Inc., dba Fleishmann's Yeast	66.57118	2844711	2743 Riverport Rd	311999
The Bryce Company, LLC	63.75	7871111	276 S. Parkway W.	322220
Atofina Chemicals, Inc.	51.85	5721411	2571 Fite Rd	325180
Penn Specialty Chemicals Inc.	46.918	5611311	3324 Chelsea Ave.	325199
Nucor Steel Memphis Inc.	38.71216	12569611	3601 Paul R. Lowry Rd	331111
KTG-USA	38.16	10693611	400 Mahannah Ave	322291
Carrier Corporation	36.44189	4963711	97 Byhalia Rd	333415
TVA Allen Combined Cycle Plant	30.53061	18912511	2480 Hennington Ave.	221112
Owens Corning Trumbull Asphalt Plant	27.76758	4980311	2301 Channel Ave	324122
Millington Municipal Jetport	21.12944	9171011	1201 Hornet Ave (Millington)	488119
Memphis Truck Rack	20.68976	18100311	321 West Mallory Ave	42471
FedEx Memphis AOC (Air Ops Complex)	19.131	5720211	2903 Sprankel	49211
South Shelby Landfill	18.00421	2845911	5494 Malone Rd	562212
The Jordan Company	13.3141	2844411	4661 Burbank Rd	331318
Memphis (Railyard)	12.44286	19756111		482111
Memphis (Harrison) Railyard	10.5303	14461311	670 W. Alcy Rd	482111
Plaskolite Tennessee, LLC	10.127	18912311	2609 Fite Rd.	326199
North Shelby Landfill	8.28104	2845611	7111 Old Millington Rd	562212
PMC Biogenix	7.06766	5706111	1231 Pope St	325992
Solae, LLC	5.90849	5863711	4272 S Mendenhall	311224
Buckeye Technologies Inc.	4.9642	4963611	1001 Tillman St	32211
Conagra Foods Grocery Group/Wesson	4.15	6443611	1351 Williams Ave	311224
General Dewitt Spain Airport	2.80124	9171211	2787 N 2nd St.	488119
Charles W. Baker Airport	2.78851	9172911	3870 Fite Rd (Millington)	488119
St. Jude Children's Research Hospital	0.9149	2846011	262 Danny Thomas Place	622110
Leewood Railyard	0.60807	14461411	1493 N. Holmes St	482111
TVA-Allen Fossil Plant	0.36654	5720111	2474 Plant Road	221112
Colonial Air Park Airport	0.27941	10939411	Collierville	488119
Isle-A-Port Airport	0.06514	12228411	1720 Harbor Ave.	488119

Richardson Strip Airport	0.02799	12227111	Eads, TN	488119
SFI of Tennessee	0.0009	18912311	4768 Hungerford Rd	336370

Blue Shade=Airports/Railyards

5.1.6 Summary of Assessment for Ozone

(a) Need for New Monitoring Sites

The SCHD AMB network is comprised of three O₃ monitoring stations. They meet the minimum requirements for the entire County. Station 47-157-0075 is the maximum design value site for the Shelby County area. This site is designed to record maximum concentrations in the CBSA (40 CFR Part 58 Appendix D). The station is an approved NCore site. The site is designed to measure maximum concentrations in an area of high population density. The site may measure maximums due to transport or during periods of stagnation and recirculation.

Although the ozone monitoring network operated by the SCHD meets the monitoring requirements of 40 CFR Part 58 Appendix D, another ozone monitor in South Memphis (filling a void within the county) may be added per EPA approval as part of a proposed expansion site.

(b) Need to Terminate Existing Sites

47-157-0075 is an approved NCore ozone site. 47-157-0021 is the highest design value located in a high population area. 47-157-1004 is located downwind of Memphis city. They are all necessary to monitor ozone concentration for Shelby County. Stations 47-157-1004 and 47-157-0021 should continue operating in the SCHD AMB network.

(c) Appropriateness of New Technologies

Currently, the SCHD AMB operates ozone analyzers with the newest generation of ozone monitoring instrument (Model T400-NumaView) manufactured by Teledyne Advanced Pollution Instrumentation, Inc at the Edmund Orgill Park and Shelby Farms (NCore) sites. The Frayser site continues to operate a T400 with Legacy software, but is an extremely stable instrument. When the instrument begins to show wear and age, it will be immediately replaced by a T400-NumaView analyzer that is stored in the lab at the SCHD-AMB. The SCHD AMB is also operating the latest T703 ozone calibrators manufactured by Teledyne Advanced Pollution Instrumentation, Inc. Teledyne technology is a proven Federal Equivalent Method (FEM) that should meet the monitoring requirements for the next five years.

The ozone monitoring stations operated by the SCHD AMB are relatively close geographically. These stations are located to determine expected maximum concentrations and to provide air quality concentration data in an area of high population density at the appropriate spatial scales. Typical concentrations measured at each site may be similar during periods of low ozone concentrations. When conditions become more extreme (due to ozone transport, stagnation, etc.), meteorological effects on ozone concentrations at individual monitoring sites may be significant. The SCHD AMB ozone monitoring stations as discussed above meet the minimum requirements of 40 CFR Part 58, Appendix D for monitoring objectives and monitor site types.

The monitoring network assessment indicates that the SCHD AMB did not violate the EPA 2015 8-hour ozone NAAQS from the years 2020, 2021, and 2022 but did violate the EPA 2015 8-hour ozone NAAQS for years 2023 and 2024. The highest design value for the most recent period is

0.073 ppm at station 47-157-0075, with station 47-157-0021 recording a design value of 0.071 for the most recent period. As the design values from two of the three SCHD ozone stations are currently violating the 8-hour ozone, the highest priority for the SCHD AMB ozone monitoring is an accurate and reliable ozone monitoring network that is in full compliance with the requirements of 40 CFR Part 58 Appendix D.

Additionally, one monitoring station operated by the Arkansas Department of Environmental Quality (ADEQ) and one station operated by the Mississippi Department of Environmental Quality (MDEA) provide stations in areas adjacent to Shelby County within the Memphis CBSA. The combination of stations operated throughout the CBSA by multiple agencies should enhance the network and exceed the minimum and adequate network of ozone monitoring stations.

5.2 Nitrogen Oxides Monitoring Network

Within the NO₂ network, there must be one micro-scale near-road NO₂ monitoring station in each CBSA with a population of 500,000 or more persons to monitor the location of expected maximum hourly concentrations sited near a major road with high annual average daily traffic (AADT) counts as specified in 40 CFR Part 58 Appendix D.

“Within the NO₂ network, there must be one monitoring station in each CBSA with a population of 1,000,000 or more persons to monitor a location of expected highest NO₂ concentrations representing the neighborhood or larger spatial scales (40 CFR 58 Appendix).”

Based on the population information and the maximum AADT, the SCHD AMB currently operates one near-road NO₂ monitoring station (47-157-0100) and one True NO₂ PAMS station at the Shelby Farms site (June-August only). The Arkansas Department of Energy and Environment operates an area-wide NO₂ monitoring station located in Marion, AR (05-035-0005). The SCHD network currently meets the requirements of 40 CFR Part 58 Appendix D.

Table 8. 2024 NO₂ 1-hr design values in Memphis TN-AR-MS CBSA

Site Name	AQS ID	County	2024 Design Value
Macon Cove-Near Road (SWTCC)	47-157-0100	Shelby, TN	8 ppb
Marion	05-035-0005	Crittenden, AR	4 ppb
Shelby Farms-PAMS**	47-157-0075	Shelby, TN	N/A***

**PAMS season operates from June through August of each year

***There was no design value in 2024 as the T500U analyzer malfunctioned shortly before the season began and was sent to a repair facility. The instrument was returned to the SCHD after the 2024 PAMS season was complete.

The combination of stations operated throughout the CBSA by multiple agencies should enhance the network and provide a minimum and adequate network of ozone monitoring stations.

5.2.1 Monitoring Objective Compliance with 40 CFR Part 58 Appendix D

(a) Provide valid ozone data to the public in a timely manner:

The SCHD AMB monitoring network collects nitrogen oxides from two monitoring sites and total reactive oxides of nitrogen data from one monitoring site. Data is downloaded every hour by TCP/IP connections to the data management system Air Vision.

The nitrogen oxides data will be uploaded to the USEPA Air Quality System (AQS) quarterly after it is validated.

(b) Support compliance with National Ambient Air Quality Standards (NAAQS):

Nitrogen oxides data from the SCHD monitoring network complies with applicable siting requirements. The data is available for NAAQS compliance determination and may be used for emissions strategy development. Data from the monitoring sites operated by the SCHD AMB

may be used in the development of attainment and maintenance plans. Data from the Near Road site (47-157-0100) is available for use in the evaluation of regional air quality models used in developing emission strategies and may be used to track trends in air pollution abatement control measures' impact on improving air quality.

(c) Support for air pollution research studies:

The Near Road site may be used to supplement data collected by researchers working on health effects assessments and atmospheric processes, or for monitoring methods development. True NO₂ data is collected from one site as part of the EPA Photochemical Assessment Monitoring Stations (PAMS) program.

5.2.2 Historical Data

The annual NO₂ design values measured at the SCHD AMB Near Road monitoring station have shown a slight decline over the last couple of years as compared to the previous 5-year period (2015-2019). The annual NO₂ design values from the Memphis CBSA monitors continue to remain well below the NAAQS (53 ppb). See Figure 27. The highest annual NO₂ design values within the Memphis CBSA are at the Macon Cove (Near Road) site at 8 ppb. The Marion, AR site fell to 4 ppb in 2024. The True NO₂ monitor that was introduced at the Shelby Farms site as part of the new PAMS program (runs from June-August) did not collect as the instrument malfunctioned and was sent for repair. Prior to the malfunction, it averaged 5 ppb from June-August in 2023.

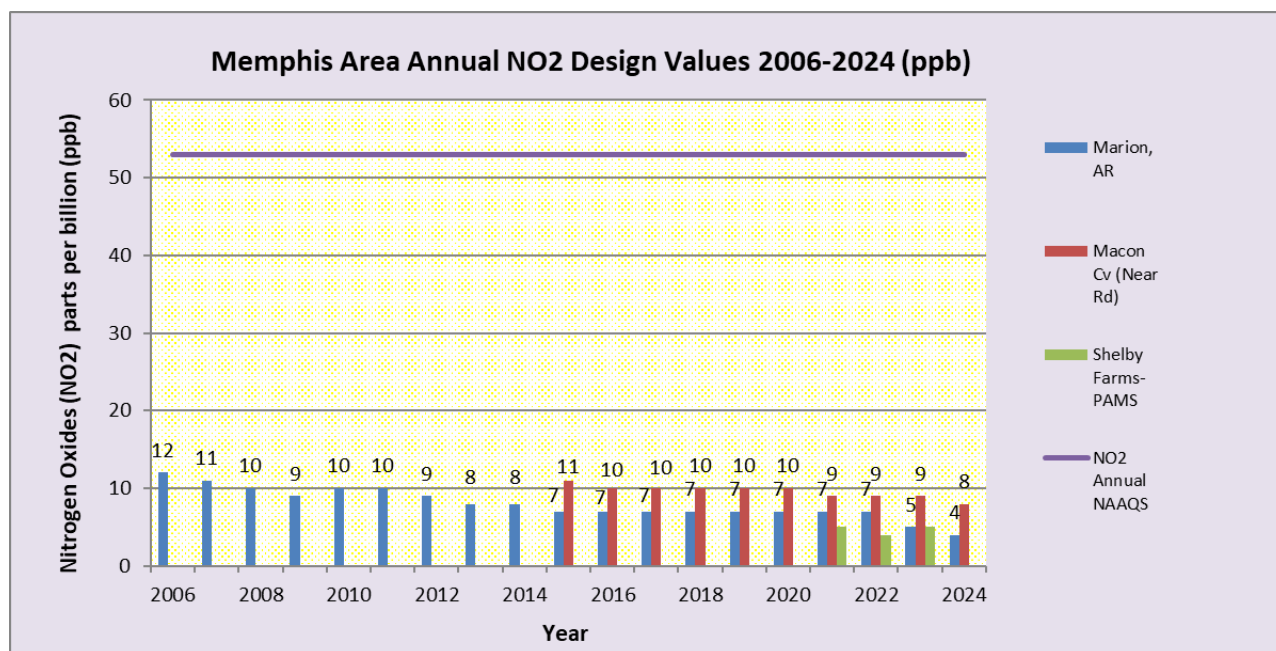


Figure 27. Annual NAAQS and Memphis Area Design Value Trends for NO₂ at sites 47-157-0100 (Macon Cove-Near Road), 05-035-0005 (Marion, AR), and 47-157-0075 (Shelby Farms-PAMS).

Note: Although the Marion, AR site is outside the Shelby County air monitoring network, the design value of the site can affect the area-wide design value for the Memphis MSA.

The 1-hour NO₂ design values measured at the SCHD AMB Near Road monitoring station as well as across the river at the Marion, AR station have fluctuated slightly, but generally remained steady over the last 5 years (2020-2024). The 1-hour NO₂ design values from the Memphis CBSA monitors continue to remain well below the NAAQS (100 ppb). See Figure 28. In 2024, the highest 1-hour NO₂ design values within the Memphis CBSA were at the Macon Cove (Near Road) site at 36 ppb. The Marion, AR site was slightly higher than the Macon Cove (Near Road) site in the years prior (2020-2023), but fell to 35 ppb in 2024. The True NO₂ monitor that was introduced at the Shelby Farms site as part of the new PAMS program (runs from June-August) did not collect as the instrument malfunctioned and was sent for repair. Prior to the malfunction, the 2023 design value averaged 26 ppb from June-August (2021-2023).

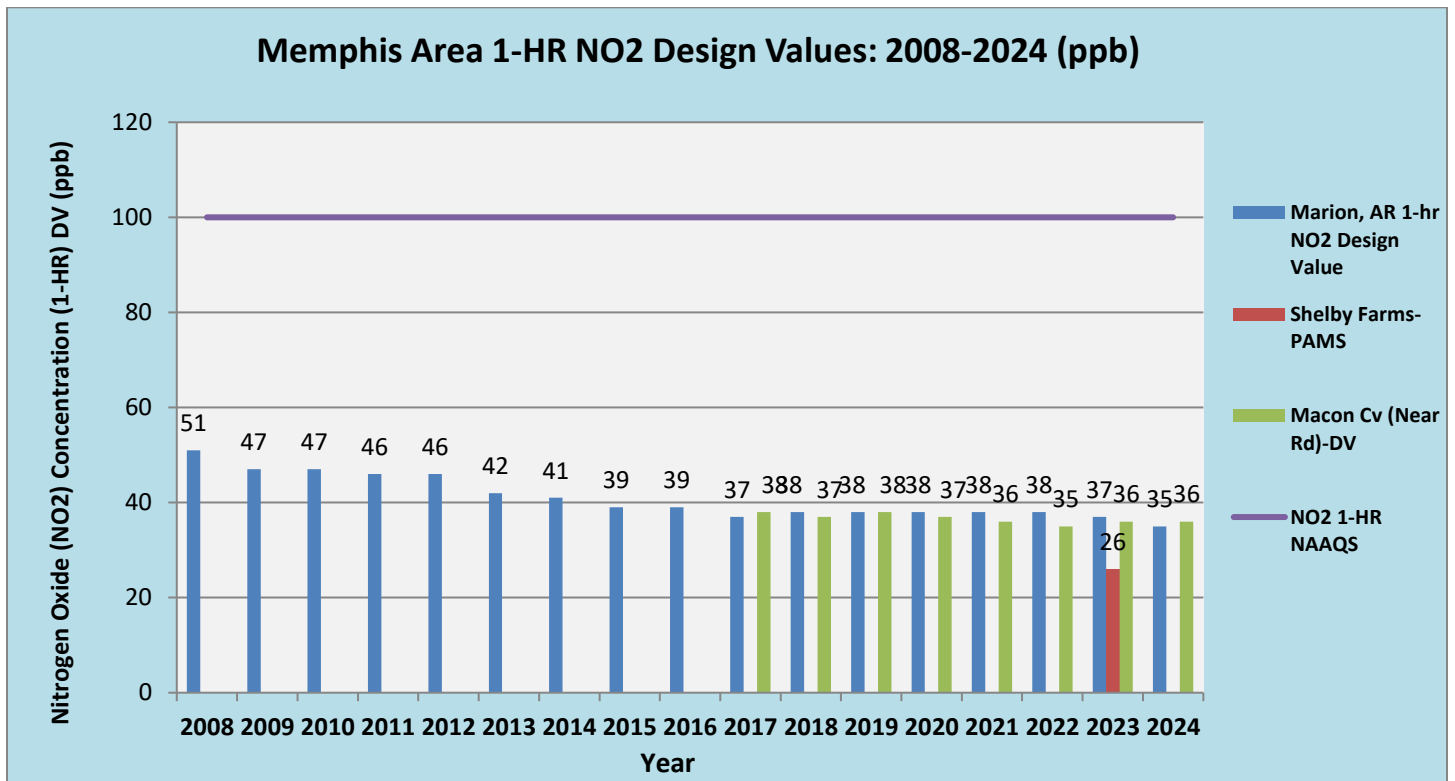


Figure 28. 1-hour NAAQS and Memphis Area Design Value Trends for NO₂ at sites 47-157-0100 (Macon Cove-Near Road), 05-035-0005 (Marion, AR), and 47-157-0075 (Shelby Farms-PAMS).

Although the Marion, AR site is outside the Shelby County air monitoring network, the design value of the site can affect the area-wide design value for the Memphis CBSA.

5.2.3 Correlation Matrix Data for Memphis CBSA NO₂ Sites

Two year-round NO₂ monitoring stations are in the Memphis CBSA. The Near Road (Macon Cove) monitor is located in Shelby County. The Marion monitor is located in Crittenden County, AR. As shown in Figure 29, these two sites serve different areas and together cover the Memphis CBSA. A third NO₂ monitoring station is located in the PAMS building at the Shelby Farms site. The Shelby Farms-PAMS monitor operates during PAMS season (June-August to support the EPA PAMS program.

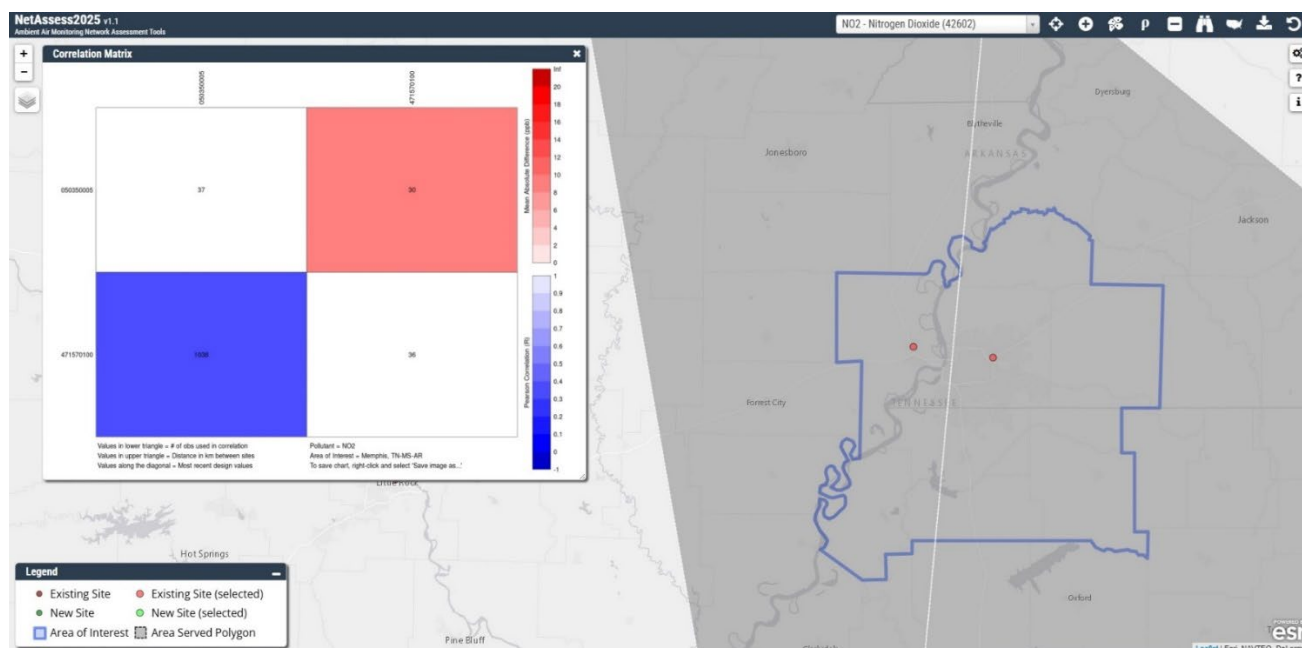


Figure 29. Memphis CBSA air monitoring NO₂ Network Correlation Data. Graph is made with the NetAssess2025 tool.

In the correlation matrix, the upper triangle numbers indicate the distance between the sites, the lower triangle numbers are the observation numbers used in correlation. The numbers in the diagonal are the 2023 Design Values. The upper triangle colors indicate the mean absolute difference and the lower triangle colors indicate the Pearson Correlations. The background color indicates the exceedance probability from years 2019 to 2021.

5.2.4 2020 National Emissions Inventory for Nitrogen Oxides in Shelby County

Figure 30 shows the location of nitrogen oxides point sources in Shelby County using the 2017 NEI (2020 map unavailable). Table 10 lists the emissions inventory (2020 NEI) of nitrogen oxides. Title V point sources are defined as sources with a potential to emit more than 100 tons per year of a regulated NAAQS pollutant, more than 10 tons per year of at least one hazardous air pollutant (HAP) or more than 25 tons per year of all HAPs combined. Note: At the time of this report, the 2023 NEI was not yet available.

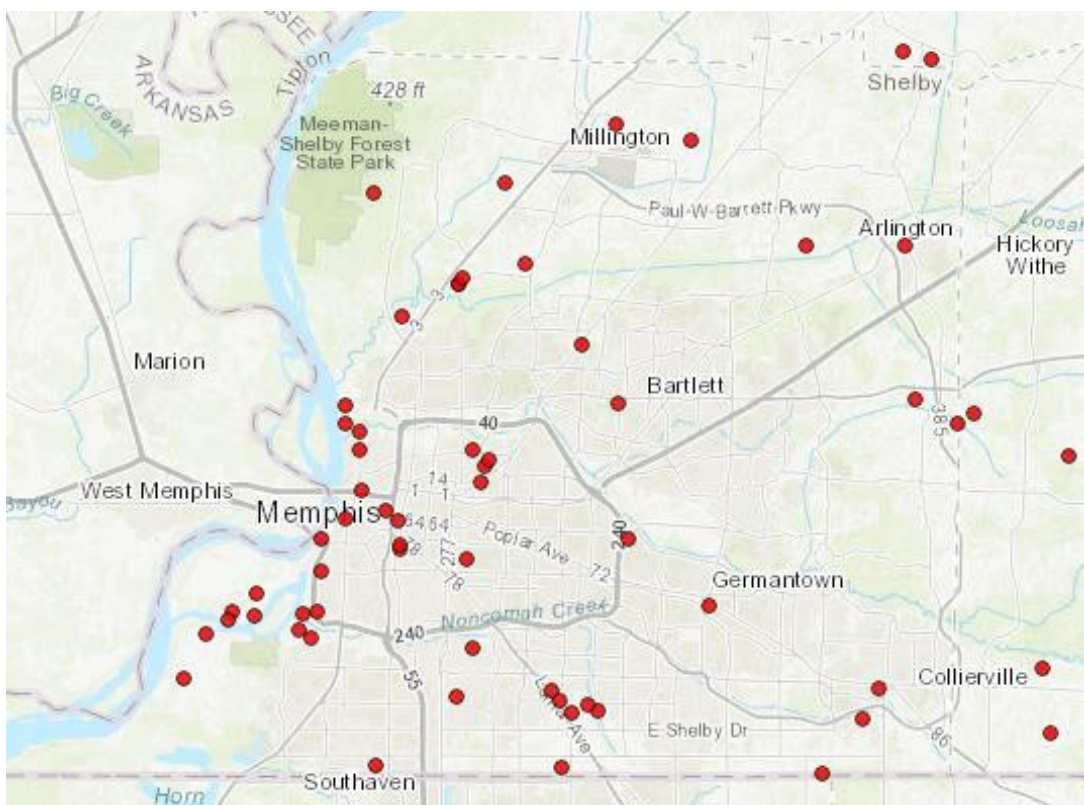


Figure 30. Map of facilities in Shelby County for 2017 nitrogen oxides emissions (2020 map unavailable). Graph and chart data are extracted from EPA 2020 NEI website.

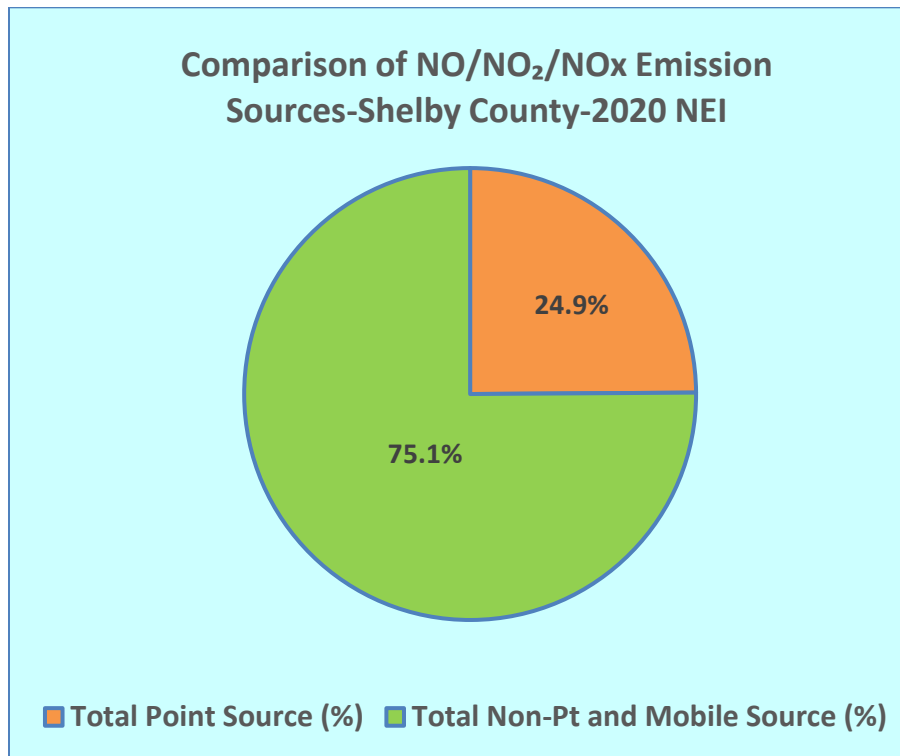


Figure 31. Percentage Comparison of Point Sources to Mobile/Non-Point Sources of Nitrogen Oxides in Shelby County, Tennessee. Data compiled from EPA 2020 NEI.

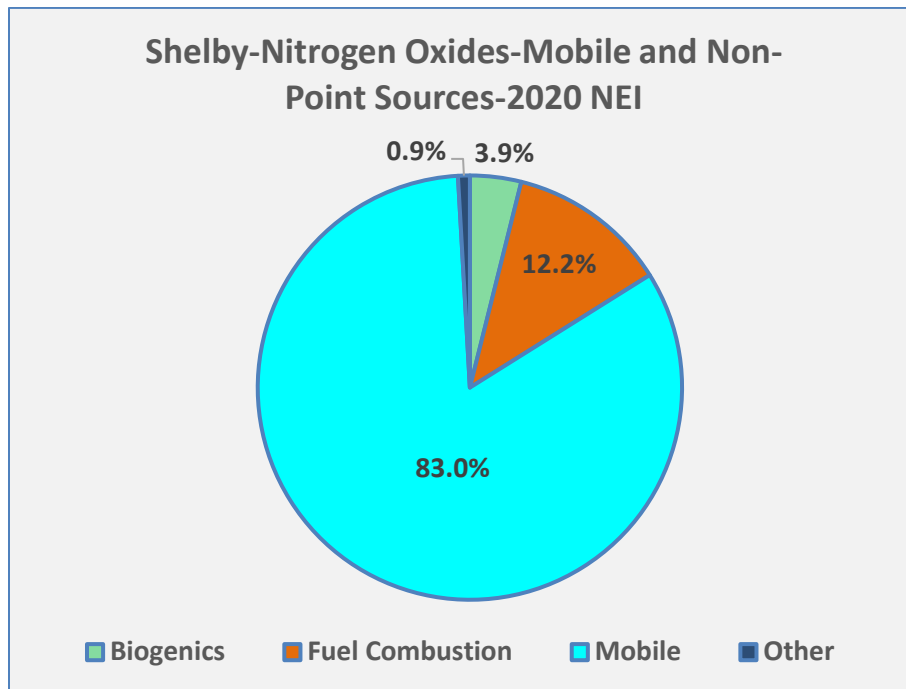


Figure 32. Percentage Comparison of Nitrogen Oxides Mobile/Non-Point Sources in Shelby County, Tennessee. Data compiled from EPA 2020 NEI.

Table 9. 2020 National Emissions Inventory for Nitrogen Oxides

Nitrogen Oxides Sources in Shelby County, TN	Nitrogen Oxides Emissions (Tons/Yr)	EIS ID	Address	NAICS Code
Memphis International Airport	1077.93717	9171111	2491 Winchester Rd	488119
E I Dupont De Nemours & Company Inc.	743.454	4963911	2751 Fite Rd	325180
Valero Refining Co.	342.6945	7156111	543 West Mallory Ave	32411
TVA Allen Combined Cycle Plant	230.48749	18912511	2480 Hennington Ave.	221112
PMC Biogenix	216.44757	5706111	1231 Pope St	325992
Memphis (Railyard)	191.6157	19756111		482111
Memphis (Harrison) Railyard	162.163	14461311	670 W. Alcy Rd	482111
Nucor Steel Memphis Inc.	156.7108	12569611	3601 Paul R. Lowry Rd	331111
Solae, LLC	114.54412	5863711	4272 S Mendenhall	311224
FedEx Memphis AOC (Air Operations Complex)	94.858	5720211	2903 Sprankel	49211
Buckeye Technologies Inc.	67.301	4963611	1001 Tillman St	32211
Atofina Chemicals, Inc.	46.25	5721411	2571 Fite Rd	325180
KTG-USA	41.24	10693611	400 Mahannah Ave	322291
Millington Municipal Jetport	38.95874	9171011	1201 Hornet Ave (Millington)	488119
PennAKem	25.738	5611311	3324 Chelsea Ave.	325199
South Shelby Landfill	21.67854	2845911	5494 Malone Rd	562212
Conagra Foods Grocery Group/Wesson	16.57	6443611	1351 Williams Ave	311224
St. Jude Children's Research Hospital	13.9737	2846011	262 Danny Thomas Place	622110
Cargill Corn Milling	11.94	5723011	2330 Buoy St	311221
Owens Corning Trumbull Asphalt Plant	11.08333	4980311	2301 Channel Ave	324122
Blues City Brewery LLC	10.76	4965611	5151 E. Raines Rd	31212
Leewood (Railyard)	12.44286	14461411	1493 N. Holmes St	482111
Archer Daniels Midland Company (ADM)	6.03	6443711	2782 Chelsea Ave	311224
AB Mauri Food Inc., dba Fleishmann's Yeast	4.45402	2844711	2743 Riverport Rd	311999
Carrier Corporation	3.69134	4963711	97 Byhalia Rd	333415
The Bryce Company, LLC	2.72	7871111	276 S. Parkway W.	322220
The Jordan Company	2.0737	2844411	4661 Burbank Rd	331318
Charles W. Baker Airport	1.51514	9172911	3870 Fite Rd (Millington)	488119
North Shelby Landfill	1.50336	2845611	7111 Old Millington Rd	562212
General Dewitt Spain Airport	1.3899	9171211	2787 N 2nd St.	488119
Plaskolite Tennessee, LLC	0.89	18912311	2609 Fite Rd	326199
Memphis Truck Rack	0.7335	18100311	321 West Mallory Ave	42471
TVA-Allen Fossil Plant	0.19683	5720111	2474 Plant Road	221112
Colonial Air Park Airport	0.1287	10939411	Collierville, TN	488119

Isle-A-Port Airport	0.03	12228411	1720 Harbor Ave.	488119
SFI of Tennessee	0.016	18912311	4768 Hungerford Rd	336370
Richardson Strip Airport	0.012	12227111	Eads, TN	488119

Blue Shade=Airports/Railyards

5.2.5 Summary of Assessment for Nitrogen Oxides

(a) Need for New Monitoring Sites

The SCHD AMB nitrogen oxides network is comprised of two monitoring stations. They meet the minimum requirements for the entire County. Station 47-157-0100 is the maximum design value site for Shelby County. This site is designed to record maximum hourly concentrations in the SCHD monitoring network (40 CFR 58 Appendix D). Station 47-157-0075 is an approved NCore site. The site is designed to measure total reactive oxides of nitrogen. The nitrogen oxides monitoring network operated by the SCHD meets the monitoring requirements of 40 CFR Part 58 Appendix D. Based on this analysis, no new nitrogen oxides sites are proposed for Shelby County.

(b) Need to Terminate Existing Sites

Stations 47-157-0075 and 47-157-0100 satisfy the minimum monitoring requirements and should continue operating within the SCHD AMB network. SCHD does not plan to terminate any of the currently operating nitrogen oxides monitoring stations.

(c) Appropriateness of New Technologies

Currently, SCHD AMB replaced all nitrogen oxides analyzers at both NCore station and Near Road station with the newest generation of monitoring instruments (Model T200U and Model T200, respectively) manufactured by Teledyne Advanced Pollution Instrumentation, Inc. Teledyne technology is a proven Federal Equivalent Method (FEM) that should meet monitoring requirements for the next five years. NO₂ instrumentation is rapidly evolving. Other new technology instruments have recently been developed that allow direct measurement of NO₂ (i.e. Teledyne T500U). A T500U analyzer has been deployed at the Shelby Farms-PAMS site for True NO₂ measurement as part of the EPA PAMS network, which operates from June-August every year.

The SCHD AMB operates one Near Road monitoring station (NO/NO₂/NO_x), one NCore station (NO/NO_y), and one PAMS station (True NO₂). The Arkansas Department of Energy and Environment-Department of Environmental Quality operates one area-wide monitoring station (NO/NO₂/NO_x). The monitoring stations operated by the SCHD AMB are located to determine the expected maximum concentrations and to provide air quality concentration data in an area with high traffic at the appropriate spatial scales. The Near Road station (47-157-0100) is sited to represent typical NO₂ concentrations. The micro-scale (47-157-0100) and neighborhood scale (47-157-0075) stations are in scale of representativeness and satisfy the minimum requirements of 40 CFR Part 58 Appendix D for monitoring objectives and monitor site types. Typical concentrations measured at each site may be similar during periods of low NO/NO₂/NO_x concentrations. When conditions become more extreme (due to transport, stagnation, etc.), meteorological effects on nitrogen oxides concentrations at individual monitoring sites may be significant.

Monitoring network assessment indicates the SCHD AMB does not violate the EPA NAAQS from years 2020 to 2024. The area-wide design value for the most recent period was recorded at station 47-157-0100. The 2024 design value for the annual NO₂ NAAQS is 36 ppb (highest DV in area network) at the Macon Cove (Near Rd) site, far below the NAAQS of 100 ppb. The 2024 design value for the NO₂ 1-hour NAAQS is 8 ppb (highest DV in area network) at the Macon Cove (Near Rd) site, far below the NAAQS of 53 ppb. Therefore, the highest priority for the SCHD AMB ambient air quality monitoring group is maintaining a reliable NO₂ monitoring network that is in full compliance with the requirements of 40 CFR58 Appendix D.

5.3 Carbon Monoxide Monitoring Network

Carbon monoxide monitoring is required at the NCore station and at the Macon Cove (Near Road) monitoring station. The SCHD AMB operates one area-wide NCore (47-157-0075) CO monitoring since April 1, 2011. The Macon (Near Road) (47-157-0100) CO monitoring was implemented July 1, 2014 in the SCHD AMB network. The SCHD CO network currently meets the requirements of 40 CFR 58 Appendix D.

Table 10. 2024 CO Design Value in Memphis TN-AR-MS CBSA

<u>Site Name</u>	<u>AQS ID</u>	<u>County</u>	<u>2024 1-Hour 2nd Maximum</u>	<u>2024 8-Hour 2nd Maximum</u>
Shelby Farms (NCore)	47-157-0075	Shelby, TN	1.1 ppm	0.7 ppm
Macon Cove (Near Road)	47-157-0100	Shelby, TN	1.2 ppm	0.8 ppm

5.3.1 Monitoring Objective Compliance with 40 CFR Part 58 Appendix D

(a) Provide air pollution data to the public in a timely manner:

The SCHD AMB monitoring network collects data from two CO monitoring sites. Data is downloaded every hour by TCP/IP connections to the SCHD data management system Air Vision. The CO data will be uploaded to the USEPA Air Quality System (AQS) quarterly after it is validated.

(b) Support compliance with national ambient air quality standards (NAAQS) and emissions strategy development:

Data from the SCHD AMB CO monitoring network complies with applicable siting requirements and is available for NAAQS compliance determination and may be used for emissions strategy development.

Data from the Near Road (47-157-0100) and NCore (47-157-0075) stations are available for use in the evaluation of regional air quality models used in developing emission strategies and may be used to track trends in air quality.

(c) Support for air pollution research studies:

The NCore site may be used to supplement data collected by researchers working on health effects assessments and atmospheric processes, air dispersion models, or for monitoring methods development.

5.3.2 Historical Data

The annual 2nd 8-hour maximum value measured at the Macon Cove (Near Road) monitoring station has remained relatively constant since 2020 except for 2022 (1.5 ppm) recording a concentration of 0.8 ppm in 2024. The highest 2nd 8-hour maximum concentration of 3.6 ppm was recorded in 2015. The CO measurements at the NCore site have been constant with patterns similar to Macon Cove (Near Road) recording a 2nd 8-hour maximum value of 0.8 ppm in 2024 with a highest 2nd 8-hour maximum of 1.5 ppm in 2022. Both concentrations are well below the CO 8-hour NAAQS of 9.0 ppm.

The annual 2nd 1-hour maximum value measured at the Macon Cove (Near Road) monitoring station has experienced a slight increase since 2020 except for 2022 (2.2 ppm) recording a concentration of 1.2 ppm in 2024. The highest 2nd 1-hour maximum concentration of 4.4 ppm was recorded in 2015. The CO measurements at the NCore site have experienced a slight increase with patterns similar to Macon Cove (Near Road) recording a 2nd 1-hour maximum value of 1.1 ppm in 2024 with a highest 2nd 1-hour maximum of 1.8 ppm in 2022. Both concentrations are well below the CO 8-hour NAAQS of 35.0 ppm.

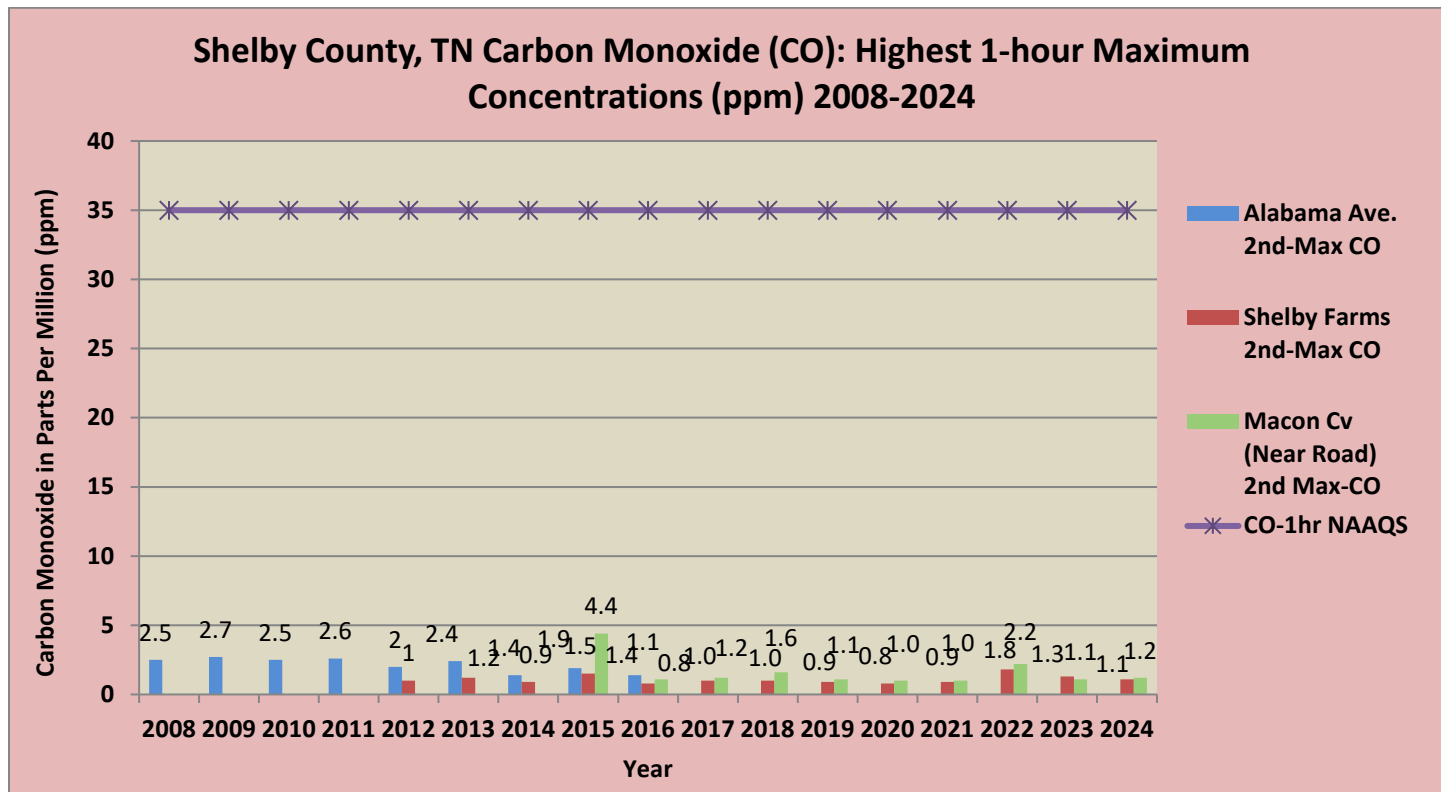


Figure 33. Annual Highest 1-hr Maximum Trend for CO at Shelby County sites

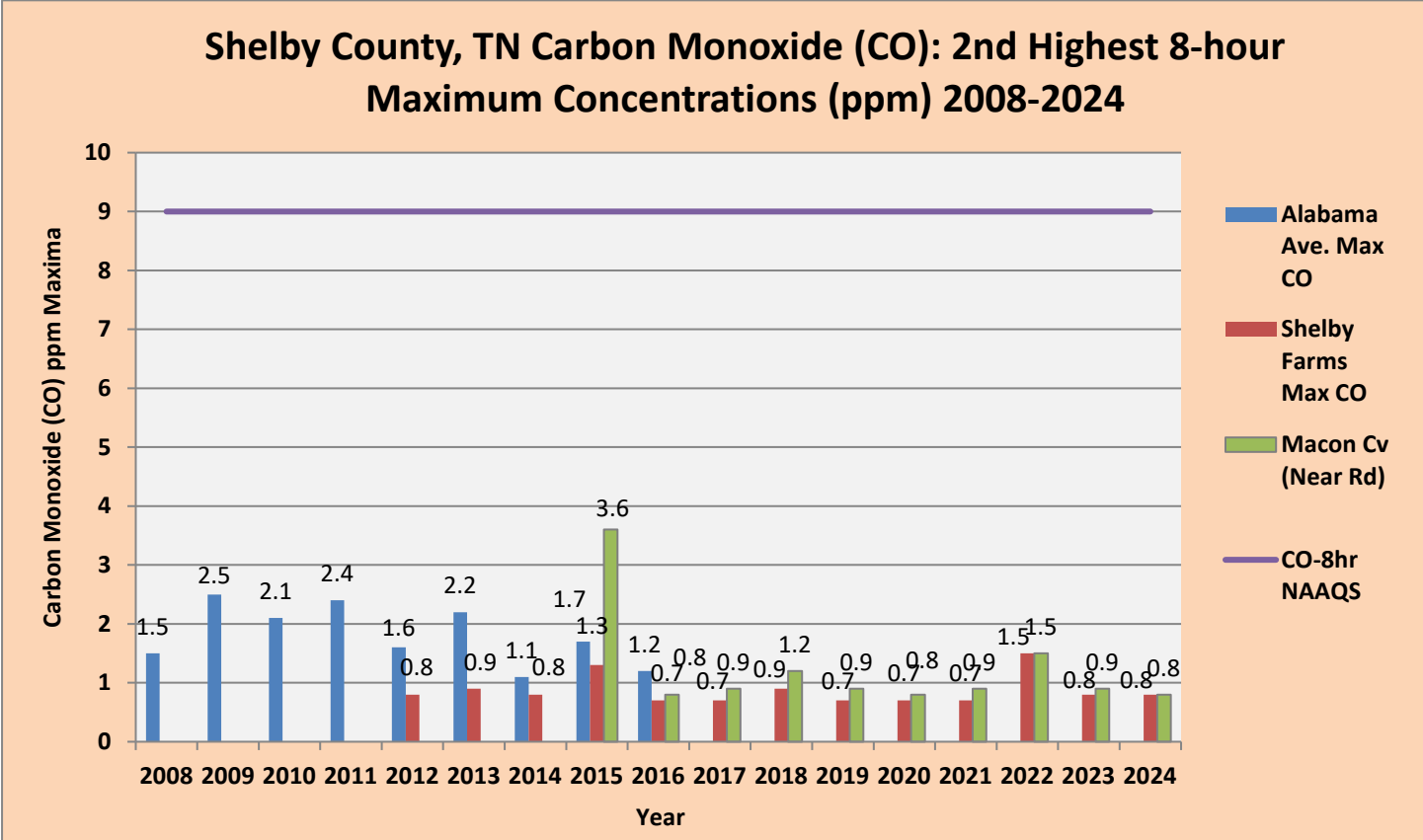


Figure 34. Annual 2nd 8-hr Maximum Trend for CO at Shelby County site

5.3.3 Correlation Matrix Data for Memphis CBSA Carbon Monoxide Sites

Two CO monitoring stations located in the SCHD AMB monitoring network are shown in Figure 31. The two sites serve different areas. In the correlation matrix, the upper triangle numbers indicate the distance between the sites, the lower triangle number is the observation number used in correlation. The numbers in the diagonal are the 2023 Design Values. The upper triangle color indicates the mean absolute difference, and the lower triangle color indicates the Pearson Correlations. The background color indicates the exceedance probability from years 2019 to 2021.

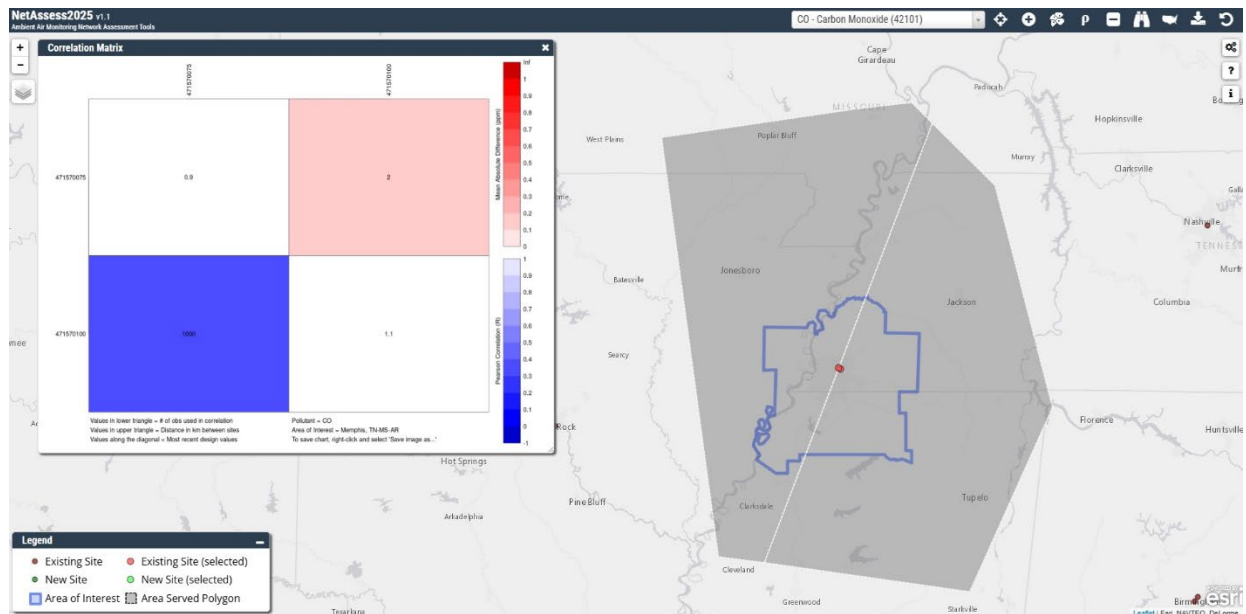


Figure 35. Memphis-TN-MS-AR CBSA air monitoring CO Network Correlation Data. Graph is made with the NetAssess2025 tool.

5.3.3 2020 National Emissions Inventory for CO

Figure 36 shows the location of nitrogen oxides point sources in Shelby County using the 2017 NEI (2020 map unavailable). Table 12 lists the emissions inventory (2020 NEI) of carbon monoxide. Title V point sources are defined as sources with a potential to emit more than 100 tons per year of a regulated NAAQS pollutant, more than 10 tons per year of at least one hazardous air pollutant (HAP) or more than 25 tons per year of all HAPs combined. Note: At the time of this report, the 2023 NEI was not yet available.

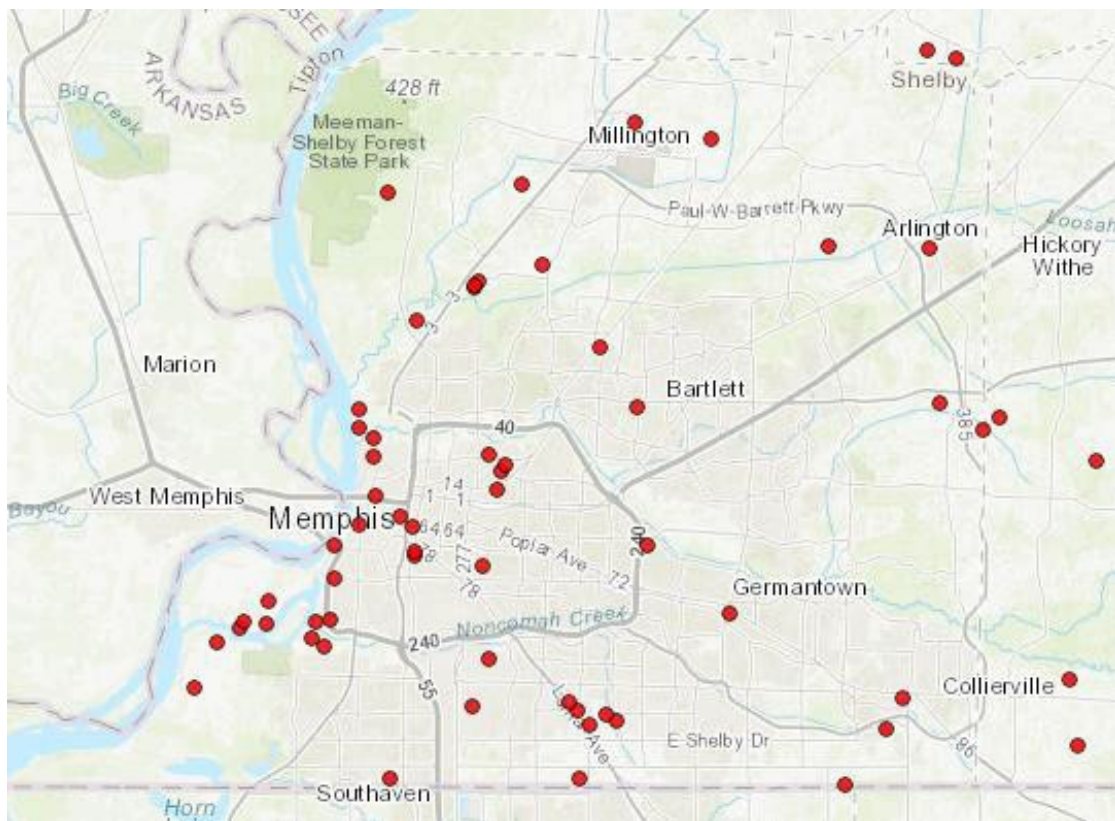


Figure 36. Map of facilities in Shelby County for 2017 Carbon Monoxide emissions (2020 map unavailable). Graph and chart data are extracted from EPA 2020 NEI website.

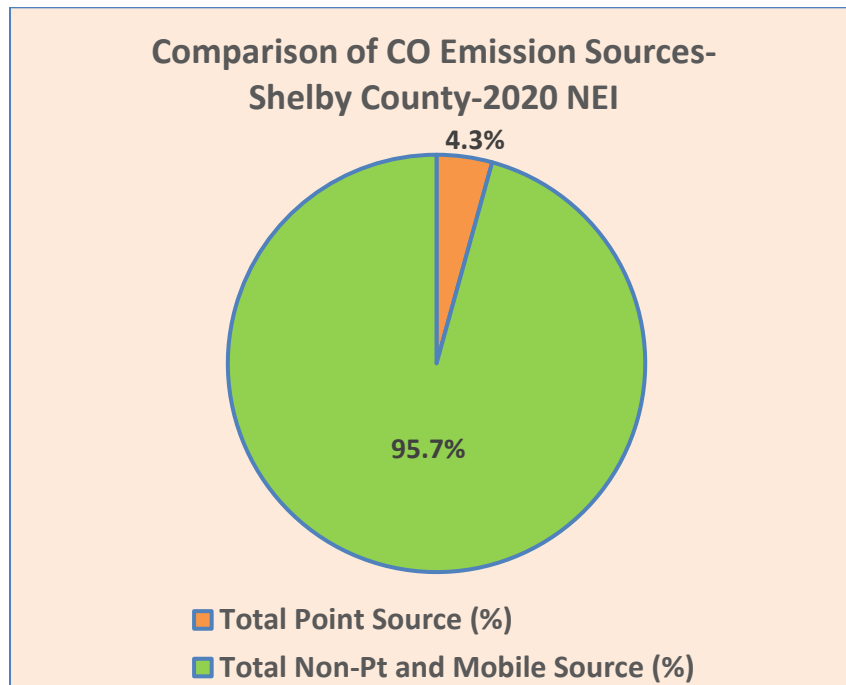


Figure 37. Percentage Comparison of Point Sources to Mobile/Non-Point Sources of Carbon Monoxide in Shelby County, Tennessee. Data compiled from EPA 2020 NEI.

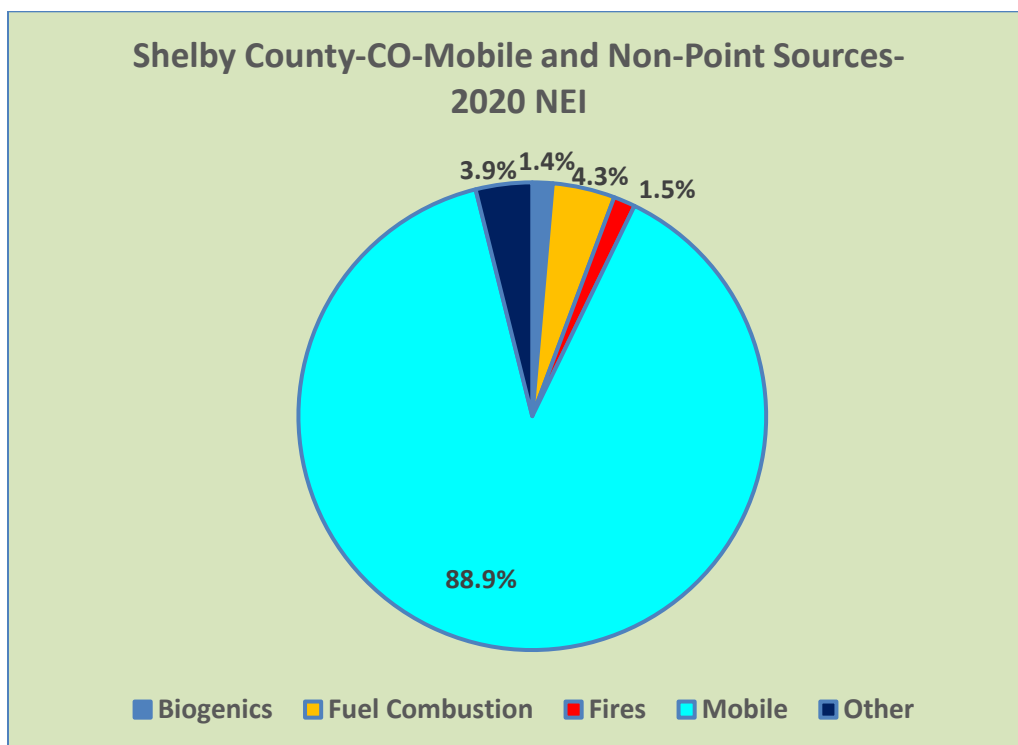


Figure 38. Percentage Comparison of Carbon Monoxide Mobile/Non-Point Sources in Shelby County, Tennessee. Data compiled from EPA 2020 NEI.

Table 11. 2020 National Emissions Inventory for CO

Carbon Monoxide Sources in Shelby County, TN	CO Emissions (Tons/Yr)	EIS ID	Address	NAICS Code
Memphis International Airport	2036.4641	9171111	2491 Winchester Rd	488119
Nucor Steel Memphis Inc.	639.7744	12569611	3601 Paul R. Lowry Rd	331111
Valero Refining Co.	304.50266	7156111	543 West Mallory Ave	32411
E I Dupont De Nemours & Company Inc.	190.864	4963911	2751 Fite Rd	325180
Solae, LLC	168.94834	5863711	4272 S Mendenhall	311224
Millington Municipal Jetport	124.37535	9171011	1201 Hornet Ave (Millington)	488119
South Shelby Landfill	113.16141	2845911	5494 Malone Rd	562212
Charles W. Baker Airport	77.73415	9172911	3870 Fite Rd (Millington)	488119
General Dewitt Spain Airport	75.86448	9171211	2787 N 2nd St.	488119
PMC Biogenix	75.6156	5706111	1231 Pope St	325992
TVA Allen Combined Cycle Plant	41.73741	18912511	2480 Hennington Ave.	221112
Owens Corning Trumbull Asphalt Plant	34.8068	4980311	2301 Channel Ave	324122
KTG-USA	31.36	10693611	400 Mahannah Ave	322291
FedEx Memphis AOC (Air Operations Complex)	28.992	5720211	2903 Sprankel	49211
Memphis (Railyard)	26.67185	19756111		482111
PennAKem	23.187	5611311	3324 Chelsea Ave.	325199
Memphis (CN-Harrison) Railyard	22.5722	14461311	670 W. Alcy Rd	482111
Buckeye Technologies Inc.	22.0802	4963611	1001 Tillman St	32211
Cargill Corn Milling	18.28	5723011	2330 Buoy St	311221
Blues City Brewery LLC	14.26	4965611	5151 E. Raines Rd	31212
Archer Daniels Midland Company (ADM)	13.95	6443711	2782 Chelsea Ave	311224
Conagra Foods Grocery Group/Wesson	13.94	6443611	1351 Williams Ave	311224
Atofina Chemicals, Inc.	12.065	5721411	2571 Fite Rd	325180
St. Jude Children's Research Hospital	10.61045	2846011	262 Danny Thomas Place	622110
Colonial Air Park Airport	8.25747	10939411	Collierville	488119
North Shelby Landfill	7.01189	2845611	7111 Old Millington Rd	562212
AB Mauri Food Inc., dba Fleishmann's Yeast	3.74138	2844711	2743 Riverport Rd	311999
Plaskolite Tennessee, LLC	2.2	18912311	2609 Fite Rd.	326199
Isle-A-Port Airport	1.92699	12228411	1720 Harbor Ave.	488119
The Jordan Company	1.7419	2844411	4661 Burbank Rd	331318
The Bryce Company, LLC	1.65	7871111	276 S. Parkway W.	322220
CSX-Leewood (Railyard)	1.30342	14461411	1493 N. Holmes St	482111
Carrier Corporation	1.24702	4963711	97 Byhalia Rd (Collierville)	333415
Memphis Truck Rack	0.84938	18100311	321 West Mallory Ave	42471
Richardson Strip Airport	0.8255	12227111	Eads, TN	488119
SFI of Tennessee	0.014	18912311	4768 Hungerford Rd	336370
TVA-Allen Fossil Plant	0.0119	5720111	2474 Plant Road	221112

Blue Shade=Airports/Railyards

5.3.4 Summary of Assessment for CO

(a) Need for New Monitoring Sites

The SCHD AMB CO network is comprised of two monitoring stations. Station 47-157-0075 is an approved NCore site. Station 47-157-0100 is an approved Near Road site. The CO monitoring network operated by the SCHD AMB meets the monitoring requirements of 40 CFR Part 58 Appendix D. A new CO monitor will be part of a plan for a proposed new monitoring site in South Memphis as part of an expansion of the Shelby County Air Monitoring Network in late 2025 or early 2026. The proposal is expected to be submitted to the EPA for review very shortly.

(b) Need to Terminate Existing Sites

Both the NCore (47-157-0075) and Near Road (47-157-0100) sites are required and will continue operating in the SCHD AMB network. No CO sites will be terminated.

(c) Appropriateness of New Technologies

Currently, the SCHD AMB uses the newest generation of CO monitoring instruments (Model T300U/T300) manufactured by Teledyne Advanced Pollution Instrumentation, Inc. Teledyne technology is a proven Federal Equivalent Method (FEM) that should meet the monitoring requirements for the next five years.

The SCHD AMB CO monitoring stations as discussed above meet the requirements of 40 CFR Part 58, Appendix D for monitoring objectives and monitor site types. The CO monitoring stations operated by the SCHD AMB are located to determine expected maximum CO concentrations and to provide air quality concentration data at the appropriate spatial scales.

The monitoring stations operated by the SCHD AMB are relatively close geographically. Typical concentrations measured at each site may be somewhat similar during periods of low CO concentrations. When conditions become more extreme (due to transport, stagnation, etc.), meteorological effects on CO concentrations at individual monitoring sites may be significant.

The monitoring network assessment indicates that the SCHD AMB does not currently (2020-2024) violate the NAAQS. The annual 2nd 8-hr maximum values at both stations are far below the NAAQS of 9 ppm. The annual 2nd 1-hr maximum values at both stations are also far below the NAAQS of 35 ppm. Therefore, the highest priority for the SCHD AMB Ambient air quality monitoring group is maintaining a reliable CO monitoring network that is in full compliance with the requirements of 40 CFR Part 58 Appendix D.

5.4 Sulfur Dioxide Monitoring Network

The required number of monitoring sites in the SO₂ network is determined by the population weighted emissions index (PWEI) for the core based statistical area (CBSA). The formula for determining the PWEI for a CBSA is found in 40 CFR Part 58 Appendix D.

PWEI is determined by multiplying the most recent Memphis CBSA population estimate (1.338M) by the total amount of SO₂ in tons per year emitted within the CBSA (2020 National

Emissions Inventory = 1019.2) and dividing the product by 1,000,000. The calculated PWEI for the Memphis TN-AR-MS CBSA is 1363.7.

“For any CBSA with a calculated PWEI value equal to or greater than 1,000,000, a minimum of three SO₂ monitors are required within that CBSA. For any CBSA with a calculated PWEI value equal to or greater than 100,000, but less than 1,000,000, a minimum of two SO₂ monitors are required within that CBSA. For any CBSA with a calculated PWEI value equal to or greater than 5,000, but less than 100,000, a minimum of one SO₂ monitor is required within that CBSA...”

The SCHD AMB is currently operating one SO₂ monitoring site in Shelby County. The Shelby Farms site is a NCore station that meets the minimum requirements of the air quality monitoring network and has compliance with 40 CFR Part 58 Appendix D.

Table 12. 2024 SO₂ Design Value in Memphis TN-AR-MS CBSA

<u>Site Name</u>	<u>AQS ID</u>	<u>County</u>	<u>2024 1-Hour Design Value</u>	<u>2024 1-Hour SO₂ NAAQS</u>
Shelby Farms (NCore)	47-157-0075	Shelby, TN	2 ppb	75 ppb

5.4.1 Monitoring Objective Compliance with 40 CFR Part 58 Appendix D

(a) Provide air pollution data to the public in a timely manner:

The SCHD AMB monitoring network collects data from one SO₂ monitoring site. Data is downloaded every hour by TCP/IP connections to the SCHD central computer system.

The SO₂ data will be uploaded to the USEPA Air Quality System (AQS) quarterly after validation.

(b) Support compliance with national ambient air quality standards (NAAQS) and emissions strategy development:

Data from the SCHD AMB SO₂ monitoring network complies with applicable siting requirements and is available for NAAQS compliance determination and may be used for emissions strategy development.

Data from the NCore (47-157-0075) is available for use in the evaluation of regional air quality models used in developing emission strategies and may be used to track trends in air quality.

(c) Support for air pollution research studies:

The NCore site may be used to supplement data collected by researchers working on health effects assessments and atmospheric processes, air dispersion models, or for monitoring methods development.

5.4.2 Historical Data

During the latest 5-year period (2020-2024) the 1-hour SO₂ design values measured at the Shelby Farms (NCore) station declined significantly as compared to the previous 5-year period (2015-2019) reporting the same design value during the 2020-2024 period (2 ppb) as shown in Figure 33.

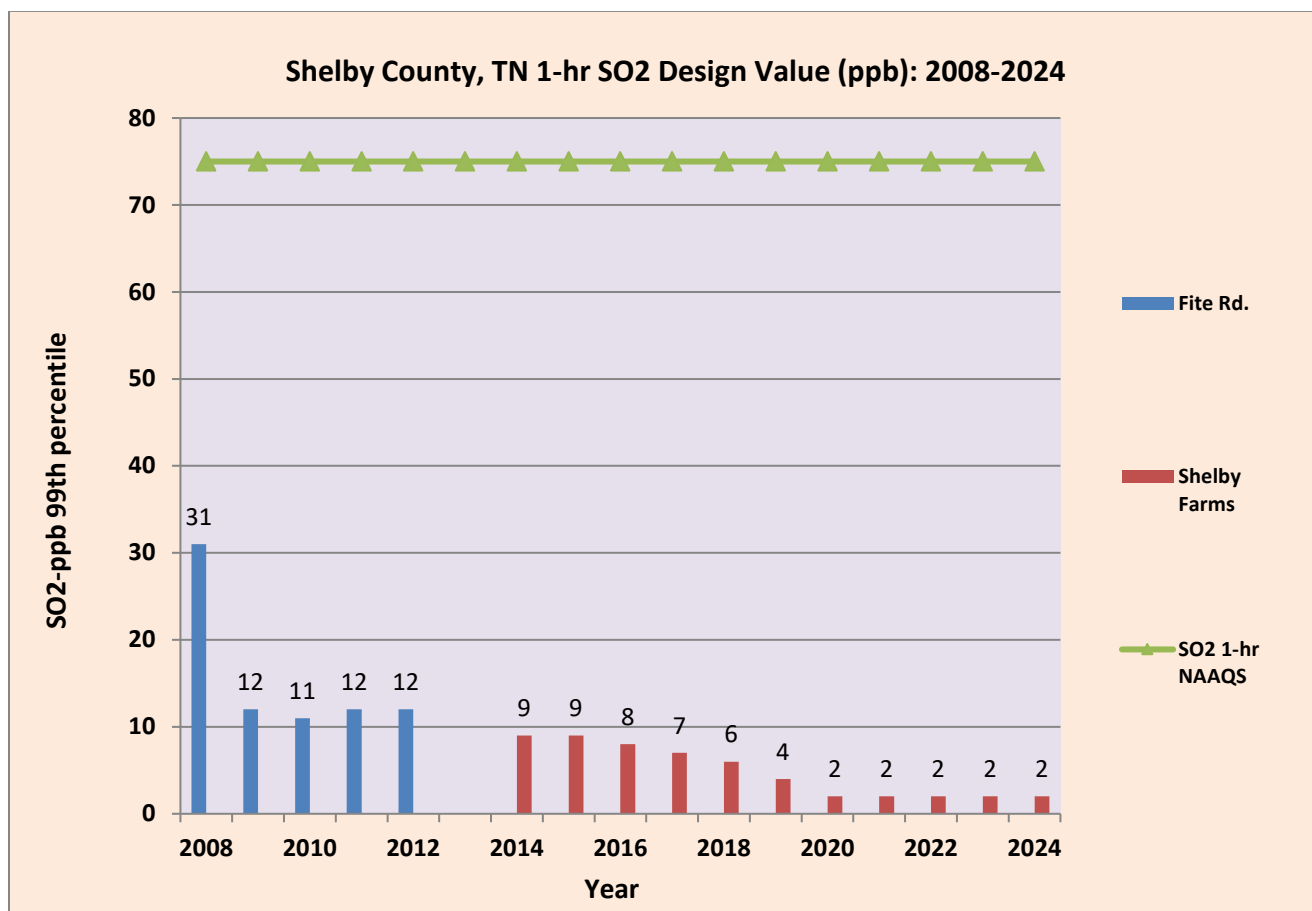


Figure 39. Annual 99th Percentile and Design value trends for Shelby County including the sole SO₂ site at Shelby Farms-NCore (47-157-0075).

5.4.3 Correlation Matrix Data for Memphis CBSA Sulfur Dioxide Sites

There is no correlation data present here because only one SO₂ monitoring site is in Shelby County as well as the Memphis MBSA.

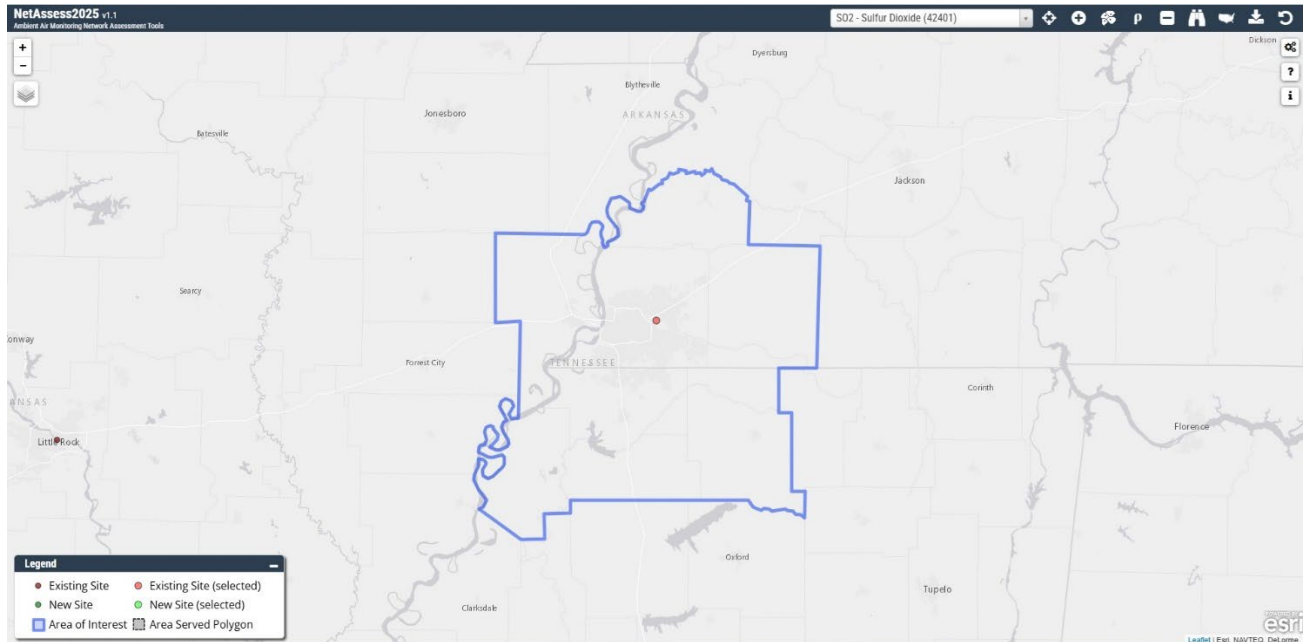


Figure 40. Memphis CBSA air monitoring SO₂ Network. Graph is made with the NetAssess2025 tool.

5.4.4 2020 National Emissions Inventory for SO₂

Figure 41 shows the location of nitrogen oxides point sources in Shelby County using the 2017 NEI (2020 map unavailable). Table 14 lists the emissions inventory (2020 NEI) of sulfur dioxide. Title V point sources are defined as sources with a potential to emit more than 100 tons per year of a regulated NAAQS pollutant, more than 10 tons per year of at least one hazardous air pollutant (HAP) or more than 25 tons per year of all HAPs combined. Note: At the time of this report, the 2023 NEI was not yet available.

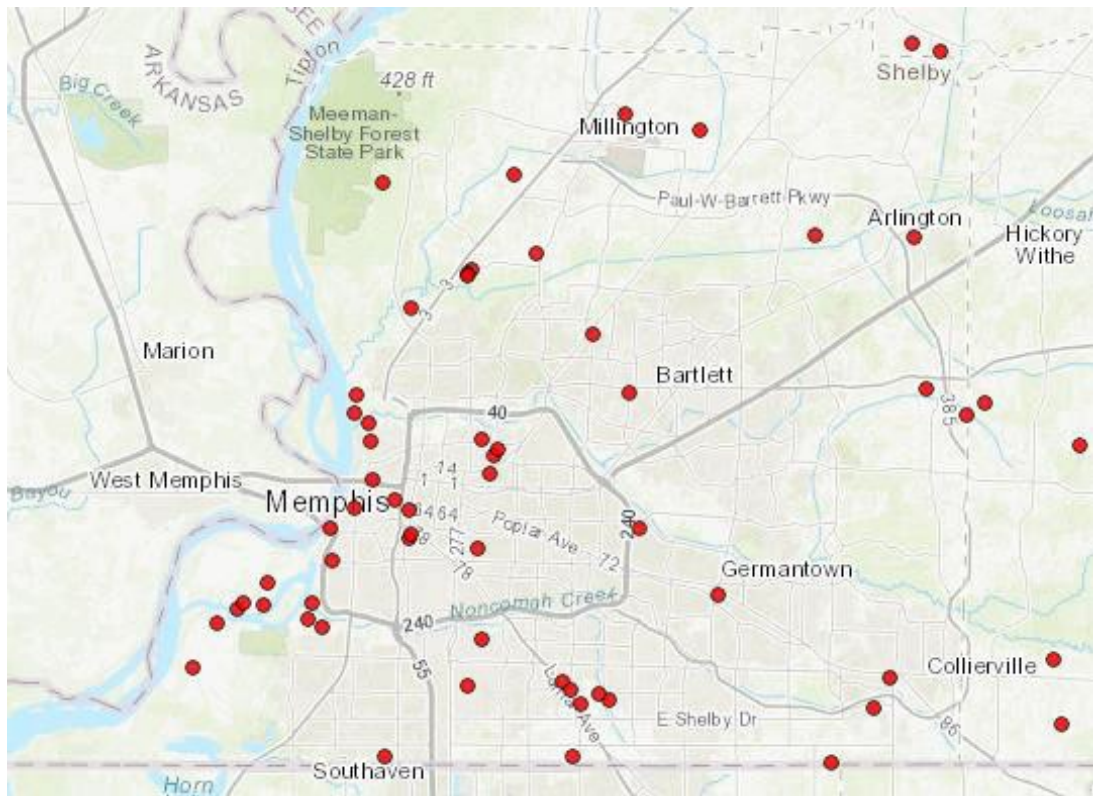


Figure 41. Map of facilities in Shelby County for 2017 SO₂ emission sources (2020 Map unavailable). Graph and chart data are extracted from EPA 2020 NEI website.

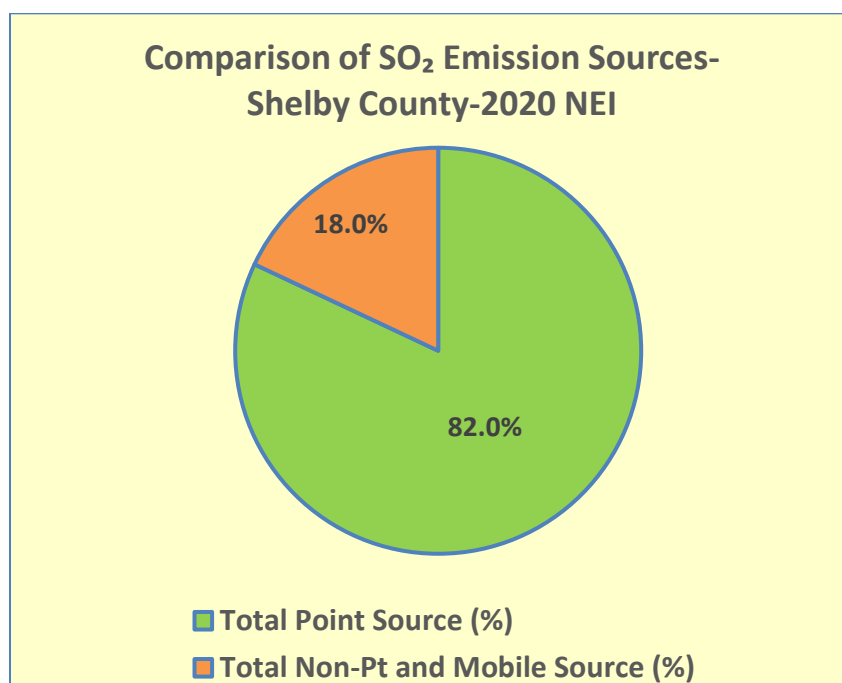


Figure 42. Percentage Comparison of Point Sources to Mobile/Non-Point Sources of Sulfur Dioxide in Shelby County, Tennessee. Data compiled from EPA 2020 NEI.

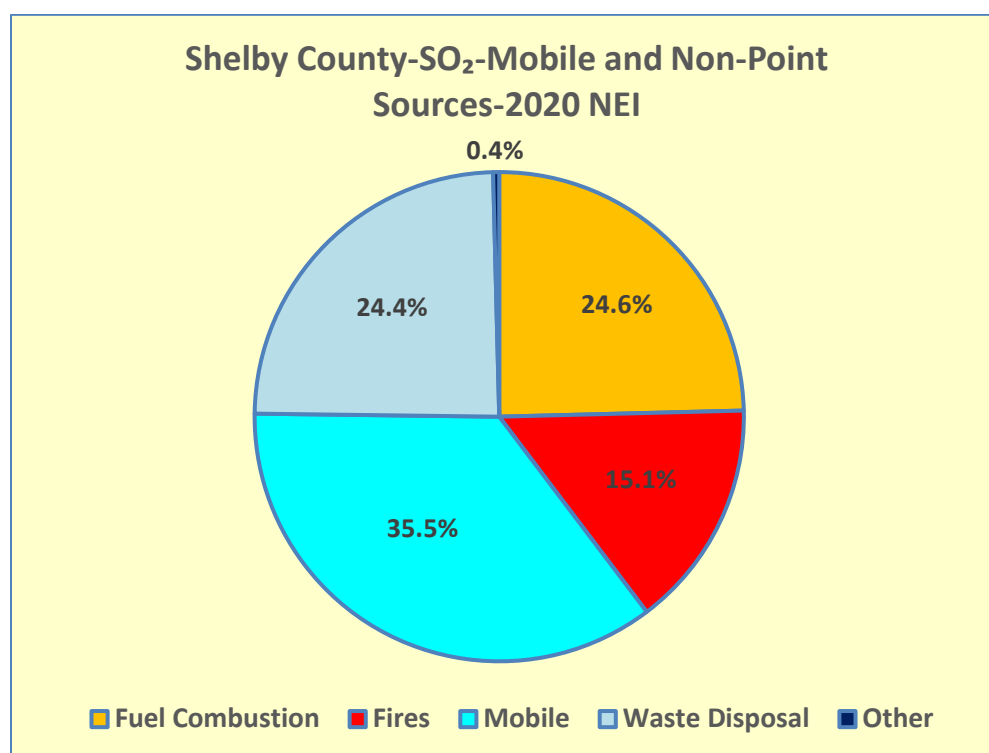


Figure 43. Percentage Comparison of Sulfur Dioxide Mobile/Non-Point Sources in Shelby County, Tennessee. Data compiled from EPA 2020 NEI.

Table 13. 2020 National Emissions Inventory for Sulfur Dioxide

Sulfur Dioxide Sources in Shelby County, TN	SO₂ Emissions (Tons/Yr)	EIS ID	Address	NAICS Code
Nucor Steel Memphis Inc.	176.86701	12569611	3601 Paul R. Lowry Rd	331111
Memphis International Airport	115.7193	9171111	2491 Winchester Rd	488119
South Shelby Landfill	58.48165	2845911	5494 Malone Rd	562212
Owens Corning Trumbull Asphalt Plant	57.10423	4980311	2301 Channel Ave	324122
Valero Refining Co.	38.79963	7156111	543 West Mallory Ave	32411
TVA Allen Combined Cycle Plant	7.40423	18912511	2480 Hennington Ave.	221112
E I Dupont De Nemours & Company Inc.	4.22	4963911	2751 Fite Rd	325180
Millington Municipal Airport	3.83283	9171011	1201 Hornet Ave (Millington)	488119
North Shelby Landfill	3.5758	2845611	7111 Old Millington Rd	562212
KTG-USA	0.737	10693611	400 Mahannah Ave	322291
PennAKem	0.681	5611311	3324 Chelsea Ave.	325199
PMC Biogenix	0.54011	5706111	1231 Pope St	325992
Solae, LLC	0.53593	5863711	4272 S Mendenhall	311224
General Dewitt Spain Airport	0.29196	9171211	2787 N 2nd St.	488119
Charles W. Baker Airport	0.28688	9172911	3870 Fite Rd (Millington)	488119
Atofina Chemicals, Inc.	0.17	5721411	2571 Fite Rd	325180
St. Jude Children's Research Hospital	0.16065	2846011	262 Danny Thomas Place	622110
Buckeye Technologies Inc.	0.14443	4963611	1001 Tillman St	32211
Cargill Corn Milling	0.13	5723011	2330 Buoy St	311221
FedEx Memphis AOC (Air Ops Complex)	0.113	5720211	2903 Sprankel	49211
Blues City Brewery LLC	0.1	4965611	5151 E. Raines Rd	31212
Archer Daniels Midland Company (ADM)	0.1	6443711	2782 Chelsea Ave	311224
Conagra Foods Grocery Group/Wesson	0.092	6443611	1351 Williams Ave	311224
Memphis (Railyard)	0.090004	19756111		482111
Memphis (Harrison) Railyard	0.0762	14461311	670 W. Alcy Rd	482111
The Bryce Company, LLC	0.03	7871111	276 S. Parkway W.	322220
Colonial Air Park Airport	0.02715	10939411	Collierville, TN	488119
AB Mauri Food Inc., dba Fleishmann's Yeast	0.02672	2844711	2743 Riverport Rd	311999
The Jordan Company	0.0124	2844411	4661 Burbank Rd	331318
Isle-A-Port Airport	0.00633	12228411	1720 Harbor Ave.	488119
Carrier Corporation	0.00591	4963711	97 Byhalia Rd	333415
CSX-Leewood (Railyard)	0.0044	14461411	1493 N. Holmes St	482111
Plaskolite Tennessee, LLC	0.004	18912311	2609 Fite Rd	326199
Richardson Strip Airport	0.00272	12227111	Eads, TN	488119
TVA-Allen Fossil Plant	0.00038	5720111	2474 Plant Road	221112
SFI of Tennessee	0.0001	18912311	4768 Hungerford Rd	336370

Blue Shade=Airports/Railyards

5.4.5 Summary of Assessment for SO₂

(a) Need for New Monitoring Sites

The SCHD AMB SO₂ network has only one monitoring station. Station 47-157-0075 is an approved NCore site. The SO₂ monitoring network operated by the SCHD AMB meets the monitoring requirements of 40 CFR Part 58 Appendix D. No new SO₂ site is required for Shelby County.

(b) Need to Terminate Existing Sites

The NCore (47-157-0075) site is required and will continue operating in the SCHD AMB network. No SO₂ sites will be terminated.

(c) Appropriateness of New Technologies

Currently, the SCHD AMB uses the newest generation of SO₂ monitoring instruments (Model 100U) manufactured by Teledyne Advanced Pollution Instrumentation, Inc. Teledyne technology is a proven Federal Equivalent Method (FEM) that should meet the monitoring requirements for the next five years.

The SCHD AMB SO₂ monitoring station as discussed above meets the requirements of 40 CFR Part 58, Appendix D for monitoring objectives and monitor site types. The SO₂ monitoring station operated by the SCHD AMB is located to determine the expected maximum SO₂ concentrations and to provide air quality concentration data at the appropriate spatial scales.

The SO₂ monitoring station operated by the SCHD AMB indicates that the SCHD AMB does not currently (2020-2024 data) violate the EPA NAAQS. The 1-hour design values are far below the NAAQS of 75 ppb. Therefore, the highest priority for the SCHD AMB ambient air quality monitoring group is a reliable SO₂ monitoring network that is in full compliance with the requirements of 40 CFR Part 58 Appendix D.

5.5 PM_{2.5} Monitoring Network

The minimum PM_{2.5} monitoring requirements are listed in Table 15 which is reproduced from Table D-5 of 40 CFR Part 58 Appendix D.

Table 14. SLAMS Minimum PM_{2.5} Monitoring Requirements

Population	Most recent 3-year design value $\geq$ 85% of any PM _{2.5} NAAQS	Most recent 3-year design value <85% of any PM _{2.5} NAAQS
>1,000,000	3	2
500,000-1,000,000	2	1
50,000-500,000	1	0

The number of sites required in the network is based on the Memphis TN-AR-MS CBSA population and design values. The 2020 census population and estimates for the three counties containing air monitoring sites are summarized in Table 5. The total population of the CBSA is near 1.338 million people. Table 16 shows the 2024 PM_{2.5} annual design values of three sites in Shelby County.

Table 15. 2024 PM_{2.5} Annual Design Values in Shelby County

Site Name	AQS ID	County	2024 Annual Design Value
Shelby Farms (NCore)	47-157-0075	Shelby, TN	8.4
Alabama	47-157-0024	Shelby, TN	8.9
Macon Rd (Near Road)	47-157-0100	Shelby, TN	8.4

The 2024 annual design value and 24-hour design value for the SCHD AMB are 8.9 µg/m³ and 20 µg/m³. The controlling design value is the annual standard. The 2024 annual design value of Shelby County is located at the Alabama Ave. site with a concentration of 8.9 µg/m³, which is close to the PM 2.5 annual NAAQS (less than 1.2%). Therefore, based on population and design value, a minimum of three PM_{2.5} monitoring stations is required for the Memphis MBSA. Currently, five PM_{2.5} monitoring stations are operating in the Memphis CBSA with three stations located in Shelby County.

Although the highest daily design value is located at Alabama Avenue for Shelby County, the highest daily design value in 2024 for the Memphis MBSA is located at Hernando, MS (23 µg/m³). This may be subject to change as the Mississippi Department of Environmental Quality has submitted an Exceptional Event Demonstration for PM_{2.5}.

In addition, the FEM (Teledyne T640x) at Shelby Farms was approved by the EPA for a two-year NAAQS exclusion (Annual and Daily). This exclusion was granted due to the results of a PM_{2.5} Continuous Monitor Comparability Assessment between the FEM (Teledyne T640x) monitor and the collocated FRM (Thermo 2025i) sampler showing a very high bias for the FEM monitor. This two-year exclusion runs from October 2023 through October 2025. This NAAQS exclusion required the Shelby Farms (NCore) site to use both the FRM and the FEM values to determine the design values that included the 2023 PM_{2.5} data. The 2024 Shelby Farms PM_{2.5} data used the FRM data exclusively for NAAQS comparison, but the 2025 year will likely use a hybrid of FRM and FEM data when the NAAQS exclusion expires.

5.5.1 Monitoring Objective Compliance with 40 CFR Part 58 Appendix D

(a) Provide valid PM_{2.5} data to the public in a timely manner:

The SCHD AMB monitoring network collects data from three PM_{2.5} monitoring sites. The SCHD AMB operates one continuous Teledyne T640x that records PM_{2.5} and PM₁₀ for regulatory purposes as well as PM Coarse (PM_{2.5-10}). The PM_{2.5} data will be uploaded to the USEPA Air Quality System (AQS) quarterly after it is validated. There are plans to install two more T640x monitors (Alabama Ave. and Macon Cove-Near Road) in the SCHD air monitoring network later in 2025.

(b) Support compliance with National Ambient Air Quality Standards (NAAQS):

Data from the SCHD AMB monitoring network complies with applicable siting requirements and is available for NAAQS compliance determination and may be used for emissions strategy development. Data from the PM_{2.5} monitoring sites operated by the SCHD AMB may also be used in air dispersion models, and the development of attainment and maintenance plans. Data from the Shelby Farms-NCore site (47-157-0075) is available for use in the evaluation of regional air quality models, air dispersion models as part of PSD or significant modification applications, and for use in developing emission strategies and tracking air quality trends.

(c) Support for air pollution research studies:

The Shelby Farms-NCore site may be used to supplement data collected by researchers working on health effects assessments and monitoring methods development.

5.5.2 Historical Data

The following graphs (Figures 44 and 45) show the PM_{2.5} trends. Although there were older PM_{2.5} sites no longer in operation, the following active Memphis MBSA sites (47-157-0024, 47-157-0100, 47-157-0075, 28-033-0002, 05-035-0005) will only be shown to allow the data from the five sites to be viewed in a clear and concise format.

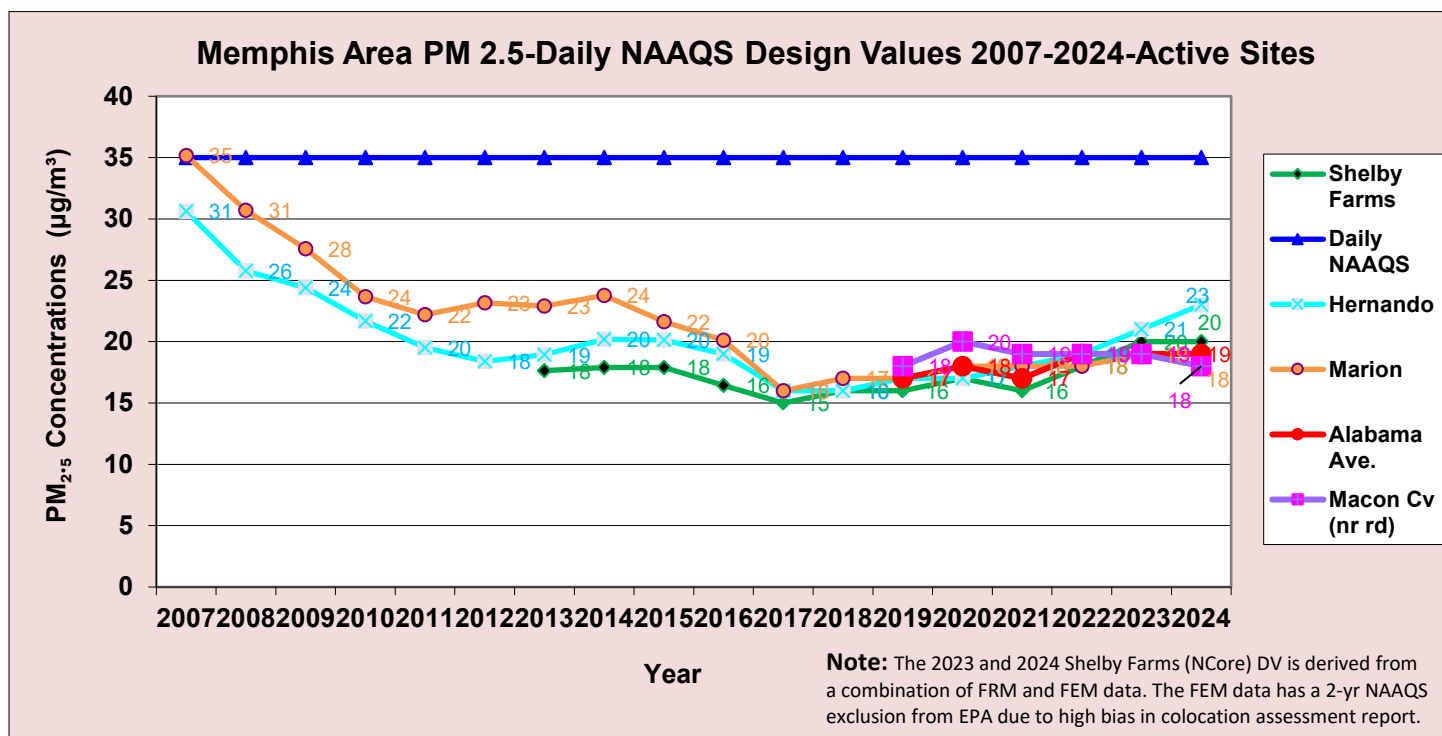


Figure 44. Memphis MBSA PM_{2.5} Daily NAAQS Design Values Historic Trend (2007-2024) for active sites.

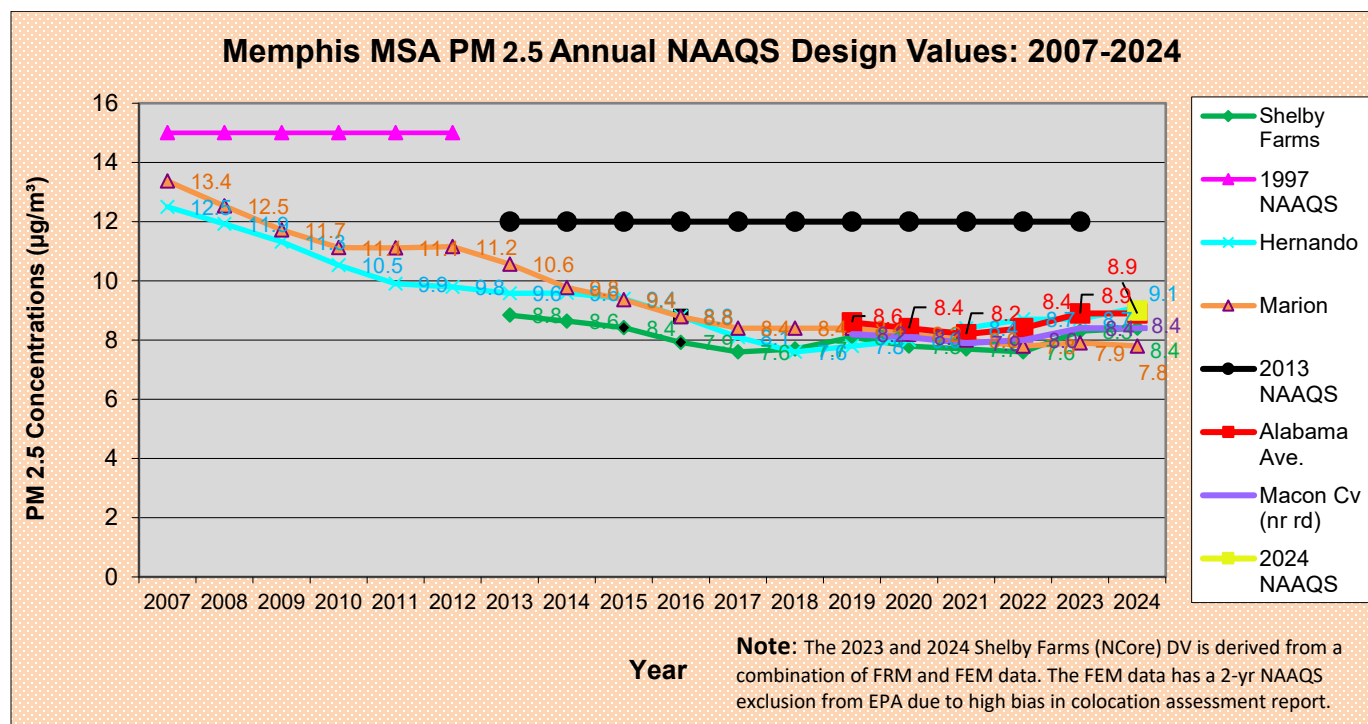


Figure 45. Memphis CBSA PM_{2.5} Annual NAAQS Design Values Historic Trend (2007-2024) for active sites.

Five PM_{2.5} monitoring stations are in the Memphis CBSA. Three are within Shelby County, TN. One site is in Crittenden County, AR and another site is in Desoto County, MS. As shown in Figure 46, these five sites serve different areas and together cover the Memphis CBSA. In the correlation matrix, the upper triangle numbers indicate the distance between the sites, the lower triangle numbers are the observation numbers used in correlation. The numbers in the diagonal are the 2023 Design Values. The upper triangle colors indicate the mean absolute difference and the lower triangle colors indicate the Pearson Correlations. The background color indicates the exceedance probability from years 2019 to 2021.



5.5.4 2020 National Emissions Inventory for PM_{2.5}

Figure 47 shows the location of PM_{2.5} point sources in Shelby County using the 2017 NEI (2020 map unavailable). Table 17 lists the emissions inventory (2020 NEI) of sulfur dioxide. Title V point sources are defined as sources with a potential to emit more than 100 tons per year of a regulated NAAQS pollutant, more than 10 tons per year of at least one hazardous air pollutant (HAP) or more than 25 tons per year of all HAPs combined. Note: At the time of this report, the 2023 NEI was not yet available.

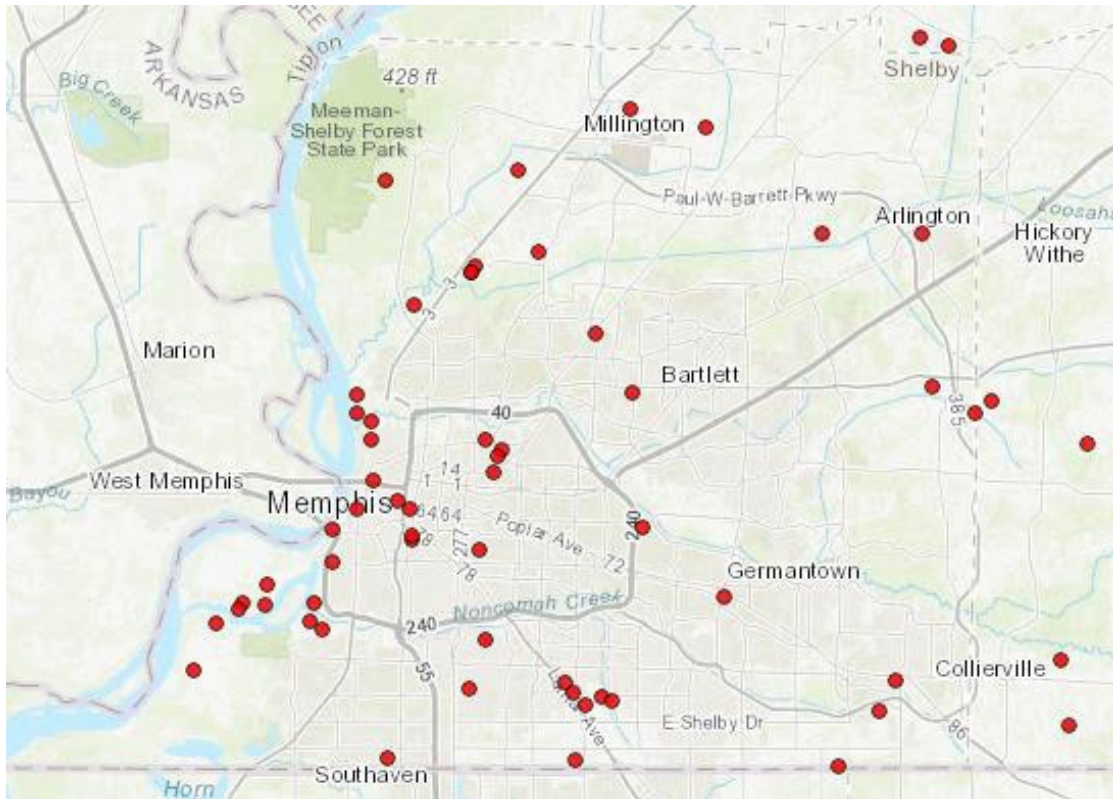


Figure 47. Map of facilities in Shelby County for 2017 PM_{2.5} in Shelby County for (2020 Map unavailable). Graph and chart data are extracted from EPA 2020 NEI website.

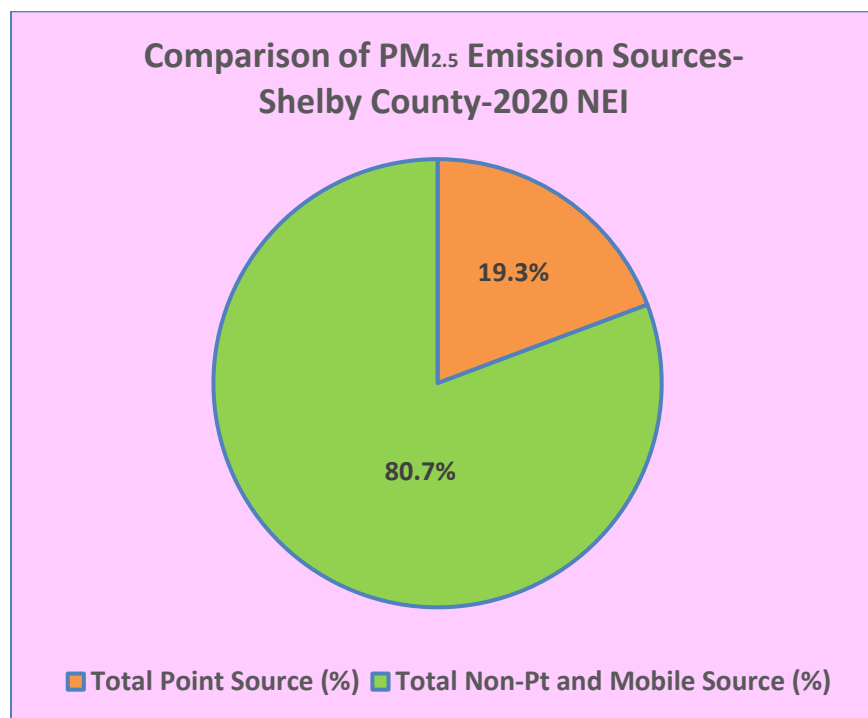


Figure 48. Percentage Comparison of Point Sources to Mobile/Non-Point Sources of Sulfur Dioxide in Shelby County, Tennessee. Data compiled from EPA 2020 NEI.

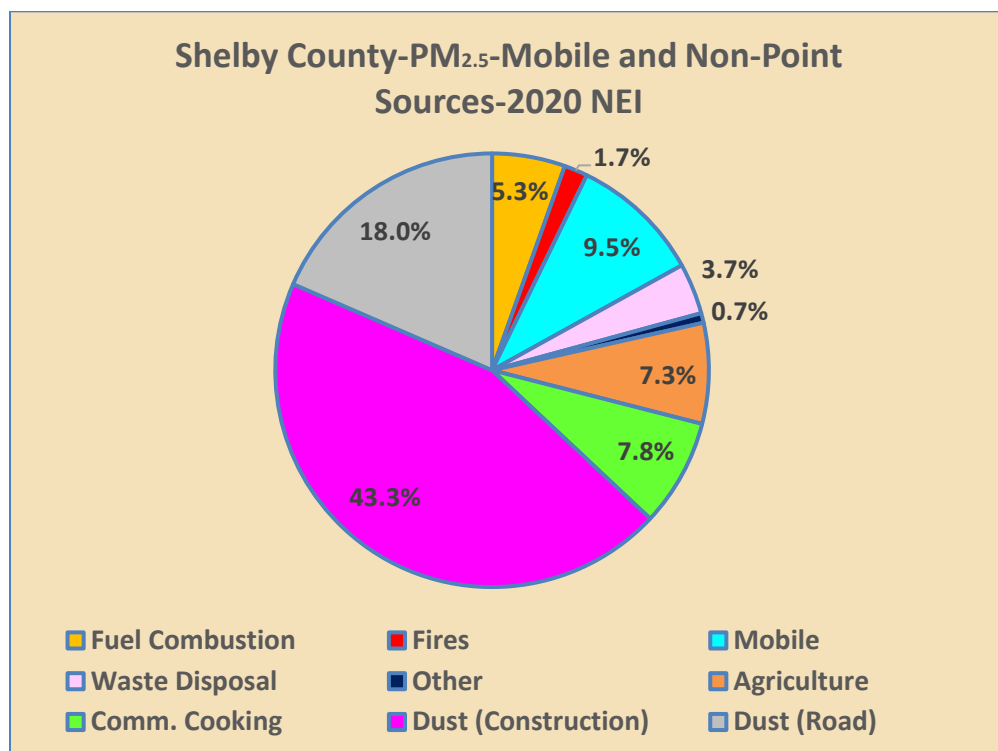


Figure 49. Percentage Comparison of PM_{2.5} Mobile/Non-Point Sources in Shelby County, Tennessee. Data compiled from EPA 2020 NEI.

Table 16. 2020 National Emissions Inventory for PM_{2.5}

PM 2.5 Sources in Shelby County, TN	PM 2.5 Emissions (Tons/Yr)	EIS ID	Address	NAICS Code
Valero Refining Co.	250.16876	7156111	543 West Mallory Ave	32411
TVA Allen Combined Cycle Plant	90.92975	18912511	2480 Hennington Ave.	221112
Nucor Steel Memphis Inc.	88.90318	12569611	3601 Paul R. Lowry Rd	331111
KTG-USA	49.75	10693611	400 Mahannah Ave	322291
Archer Daniels Midland Company (ADM)	49.74853	6443711	2782 Chelsea Ave	311224
Solae, LLC	36.22247	5863711	4272 S Mendenhall	311224
Cargill Corn Milling	27.50716	5723011	2330 Buoy St	311221
E I Dupont De Nemours & Company Inc.	16.63855	4963911	2751 Fite Rd	325180
Memphis International Airport	16.07458	9171111	2491 Winchester Rd	488119
PMC Biogenix	11.90106	5706111	1231 Pope St	325992
Owens Corning Trumbull Asphalt Plant	11.36083	4980311	2301 Channel Ave	324122
South Shelby Landfill	11.04104	2845911	5494 Malone Rd	562212
Buckeye Technologies Inc.	7.85455	4963611	1001 Tillman St	32211
PennAKem	5.11078	5611311	3324 Chelsea Ave.	325199
Atofina Chemicals, Inc.	5.10535	5721411	2571 Fite Rd	325180
FedEx Memphis AOC (Air Operations Complex)	4.98545	5720211	2903 Sprankel	49211
Memphis (Railyard)	4.87778	19756111		482111
North Shelby Landfill	4.18344	2845611	7111 Old Millington Rd	562212
CN-Memphis (Harrison) Railyard	4.12803	14461311	670 W. Alcy Rd	482111
Millington Municipal Airport	3.73856	9171011	1201 Hornet Ave (Millington)	488119
General Dewitt Spain Airport	1.47567	9171211	2787 N 2nd St.	488119
Plaskolite Tennessee, LLC	1.4544	18912311	2609 Fite Rd.	326199
Charles W. Baker Airport	1.38381	9172911	3870 Fite Rd (Millington)	488119
SFI of Tennessee	1.2137	18912311	4768 Hungerford Rd	336370
Carrier Corporation	1.12941	4963711	97 Byhalia Rd	333415
Conagra Foods Grocery Group/Wesson	0.83819	6443611	1351 Williams Ave	311224
St. Jude Children's Research Hospital	0.72113	2846011	262 Danny Thomas Place	622110
AB Mauri Food Inc., dba Fleishmann's Yeast	0.33851	2844711	2743 Riverport Rd	311999
CSX-Leewood (Railyard)	0.23837	14461411	1493 N. Holmes St	482111
The Bryce Company, LLC	0.1479	7871111	276 S. Parkway W.	322220
Colonial Air Park Airport	0.14341	10939411	Collierville, TN	488119
The Jordan Company	0.08905	2844411	4661 Burbank Rd	331318
Isle-A-Port Airport	0.03346	12228411	1720 Harbor Ave.	488119
Richardson Strip Airport	0.01435	12227111	Eads, TN	488119
TVA-Allen Fossil Plant	0.00553	5720111	2474 Plant Road	221112

Blue Shade=Airports/Railyards

5.5.5 Summary of Assessment for PM_{2.5}

(a) Need for New Monitoring Sites

The SCHD AMB PM_{2.5} network is comprised of three monitoring stations. Station 47-157-0075 is an approved NCore site. The PM_{2.5} monitoring network operated by the SCHD meets the monitoring requirements of 40 CFR Part 58 Appendix D. Based on this analysis, no new PM_{2.5} sites are needed for Shelby County.

(b) Need to Terminate Existing Sites

Each PM_{2.5} site operated by the SCHD AMB serves a specific purpose. They are all necessary to monitor PM_{2.5} concentrations for Shelby County. These three stations should continue operating in the SCHD AMB network.

(c) Appropriateness of New Technologies

Currently, all Federal Reference Method (FRM) PM_{2.5} instruments in the SCHD AMB monitoring network are from Thermo Environmental Instrumentation, Inc. Thermo technology is proven for FRM instruments and should meet the monitoring requirements for the next five years. Currently, there is one Teledyne-API T640x continuous FEM monitor at the Shelby Farms (NCore) site. The Teledyne-API technology is proven and among the most popular for continuous FEM PM instruments. The T640x is expected to meet monitoring requirements for the next five years. Two more T640x instruments are expected to be installed later in 2025 at the Alabama Ave. (47-157-0100) site (replacing the 2025-POC2 instrument) and the Macon Cove-Near Road (47-157-0100) site.

The SCHD AMB monitoring stations as discussed above meet the requirements of 40 CFR Part 58, Appendix D for monitoring objectives and monitoring site types. The PM_{2.5} monitoring stations operated by the SCHD AMB are located to determine expected maximum concentrations and to provide air quality concentration data in an area of high population density at the appropriate spatial scales. These stations meet the minimum requirements of the SCHD AMB monitoring network.

The monitoring stations operated by SCHD AMB are relatively close geographically. Typical concentrations measured at each site may be somewhat similar during periods of low PM_{2.5} concentrations. When conditions become more extreme (due to transport, stagnation, etc.), meteorological effects on PM_{2.5} concentrations at individual monitoring sites may be significant. The monitoring network assessment indicates that the SCHD AMB does not currently (2020-2024) violate the EPA NAAQS. The design value for the most recent period was recorded at station 47-157-0024. The annual design value at this station is 8.6 µg/m³. Therefore, the highest priority for the SCHD AMB is a reliable PM_{2.5} monitoring network that is in full compliance with the requirements of 40 CFR Part 58 Appendix D.

Additionally, one monitoring station operated by the Arkansas Department of Environmental Quality (ADEQ) and one station operated by the Mississippi Department of Environmental Quality (MDEA) provide PM_{2.5} data in areas adjacent to Shelby County within the Memphis CSBA. The combination of stations operated throughout the CBSA by multiple agencies should enhance the network and exceed the minimum and adequate network of PM_{2.5} monitoring stations.

5.6 PM₁₀ Monitoring Network

The minimum PM₁₀ monitoring requirements are listed in Table 18 which is reproduced from Table D-4 of 40 CFR Part 58 Appendix D.

Table 17. SLAMS minimum PM₁₀ monitoring requirements

Population	High Concentration (>120% of the PM ₁₀ NAAQS)	Medium Concentration (>80% of the PM ₁₀ NAAQS)	Low Concentration (<80% of the PM ₁₀ NAAQS)
>1,000,000	6-10	4-8	2-4
500,000-1,000,000	4-8	2-4	1-2
250,000-500,000	3-4	1-2	0-1
100,000-250,000	1-2	0-1	0

The number of sites required in the network is based on the Memphis-TN-AR-MS population and design values. The 2020 census population and estimates for Shelby County are summarized in Table 5. The total estimated population of Shelby County is 910,530. The total estimated Memphis-TN-AR-MS CBSA (Shelby, Tipton and Fayette counties in TN, Crittenden County, AR, as well as DeSoto, Marshall, Tate, and Tunica counties in MS) population is near 1,341,000. The total estimated population of the Memphis-TN-AR-MS CBSA that contain air pollution monitoring sites (Shelby Co., TN-Crittenden Co., AR-DeSoto County, MS) is approximately 1.16 million.

Currently, two PM₁₀ monitoring stations (47-157-0024 and 47-157-0075) are operating in Shelby County. The PM₁₀ monitor at the Alabama Ave site is a continuous TEOM (Thermo) FEM instrument. Shelby Farms-NCore site contains a continuous Teledyne-API T640x FEM monitor that reports PM₁₀ data at standard temperature and pressure (method code 81102) and also reports NAAQS-excluded PM₁₀ data under local conditions (method code 85101). There are plans to install two more T640x instruments later in 2025. One will replace the continuous TEOM PM₁₀ instrument at Alabama Ave. and the other will be placed at the Macon Cove-Near Road site (47-157-0100).

5.6.1 Monitoring Objective Compliance with 40 CFR Part 58 Appendix D

(a) Provide air pollution data to the public in a timely manner:

The SCHD AMB PM₁₀ monitoring network collects data from two PM₁₀ monitoring sites.

There is a continuous FEM sampler (Thermo, TEOM 1405) at the Alabama site (47-157-0024). A continuous T640x FEM instrument (Teledyne-API) is located at the Shelby Farms (NCore) site (47-157-0075). After the PM₁₀ data is validated, it is uploaded to the USEPA Air Quality System (AQS). Data uploads are performed on a quarterly basis.

(b) Support compliance with National Ambient Air Quality Standards (NAAQS) and emissions strategy development:

Data from the SCHD AMB PM₁₀ monitoring network complies with applicable siting requirements and is available for NAAQS compliance determination and may be used for emissions strategy development. Data from the two monitoring sites operated by the SCHD may be used in the development of attainment and maintenance plans. Site data may be used within air dispersion models as part of PSD or significant modification applications. Other uses include data as part of the evaluation of regional air quality models when developing emission strategies as well as tracking air quality trends.

(c) Support for air pollution research studies:

Data from the SCHD AMB PM₁₀ monitoring network may be used to supplement data collected by researchers working on health effects assessments and monitoring methods development.

Table 18. SCHD PM₁₀ Design Values 2024-All Values are measured in µg/m³

Year	Alabama Avenue Highest Daily PM ₁₀ Max	Alabama Avenue 2nd Highest Daily PM ₁₀ Max	Shelby Farms-NCORE Highest Daily PM ₁₀ Max	Shelby Farms-NCORE 2nd Highest Daily PM ₁₀ Max	PM ₁₀ NAAQS
2023	72	67	92	65	150
2024	118	59	148*	85	150

*Although Table 19 shows that PM₁₀ in Shelby County was below the NAAQS threshold of 150 µg/m³, the highest daily maximum in 2024 was near the threshold at 148 µg/m³. This occurred on 8/1/2024 as a documented Saharan dust storm moved through the region. There was no regulatory significance on 8/1/2024 since the daily average PM₁₀ concentration values fell below the NAAQS. Therefore, an exceptional event demonstration was not considered. However, as the daily concentration value was above 80% of the NAAQS, it would require a minimum of four PM₁₀ monitors. While the SCHD is planning to add a PM₁₀ monitor as part of the installation of the T640x instrument at the Macon Cove-Near Rd site, this would only bring a total of three PM₁₀ monitors for the Memphis-TN-AR-MS CBSA. A concentration of 148 µg/m³ is 98.67% of the NAAQS, which would trigger the Memphis CBSA to be moved to medium concentration of the SLAMS minimum PM₁₀ monitoring requirements as found in 40 CFR Part 58 Appendix D. The SCHD is planning to show that the concentrations of that day should not require an additional monitor due to dust transport. Appendix A for this 5-year network assessment will provide evidence and descriptions of the event.

5.6.2 Historical Data

Although historical county-wide data is available, historical active site data is limited, as the PM₁₀ site at Gas Service Station (GSC) was relocated to the Alabama site in 2017. Alabama Ave. hosted a high-volume gravimetric sampler at the site prior to 2017. Continuous PM₁₀ sampling has a longer historical trend at the Shelby Farms-NCORE site, but the instrumentation changed in 2021 (currently a T640x). See figures 50 and 51.

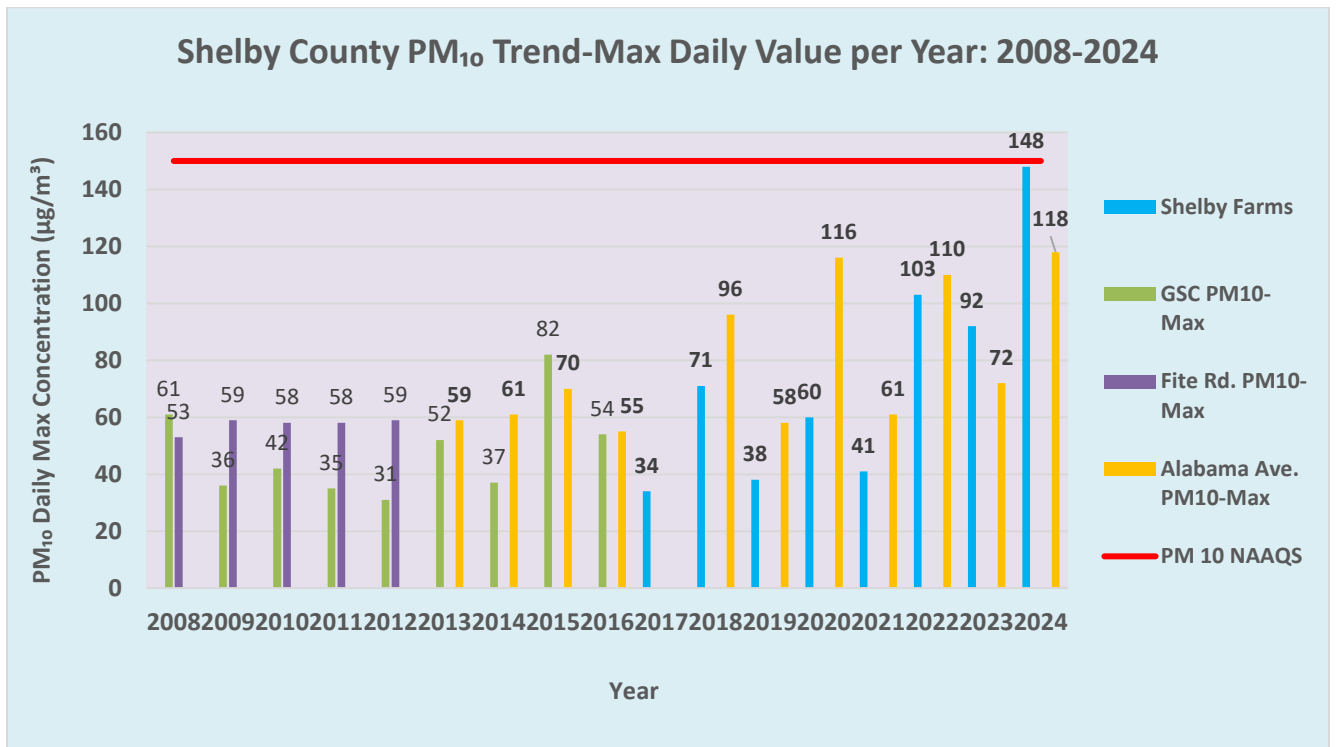


Figure 50. Shelby County Air Monitoring Network for PM₁₀ sites showing trend for maximum daily value of every year per site (values are in µg/m³).

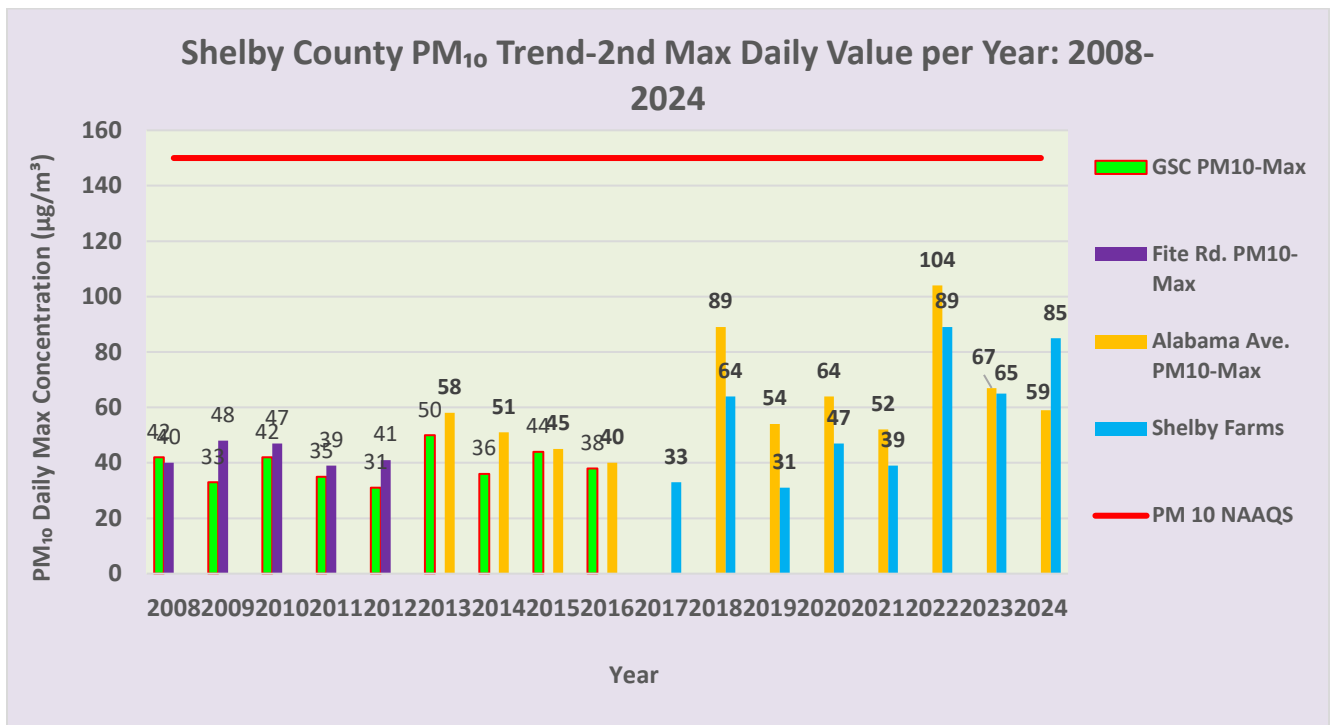


Figure 51. Shelby County Air Monitoring Network for PM₁₀ sites showing trend for 2nd maximum daily value of every year per site (values are in µg/m³).

PM₁₀ Correlation Matrix Data for Memphis CBSA Sites

Two PM₁₀ monitoring stations are in Shelby County. As shown in Figure 47, the two PM₁₀ sites serve different areas. In the correlation matrix, the upper triangle number indicates the distance between the sites, the lower triangle number is the observation numbers used in correlation. The numbers in the diagonal are the 2023 Design Values. The upper triangle color indicates the mean absolute difference and the lower triangle color indicates the Pearson Correlations. The background color indicates the exceedance probability from years 2019 to 2021.

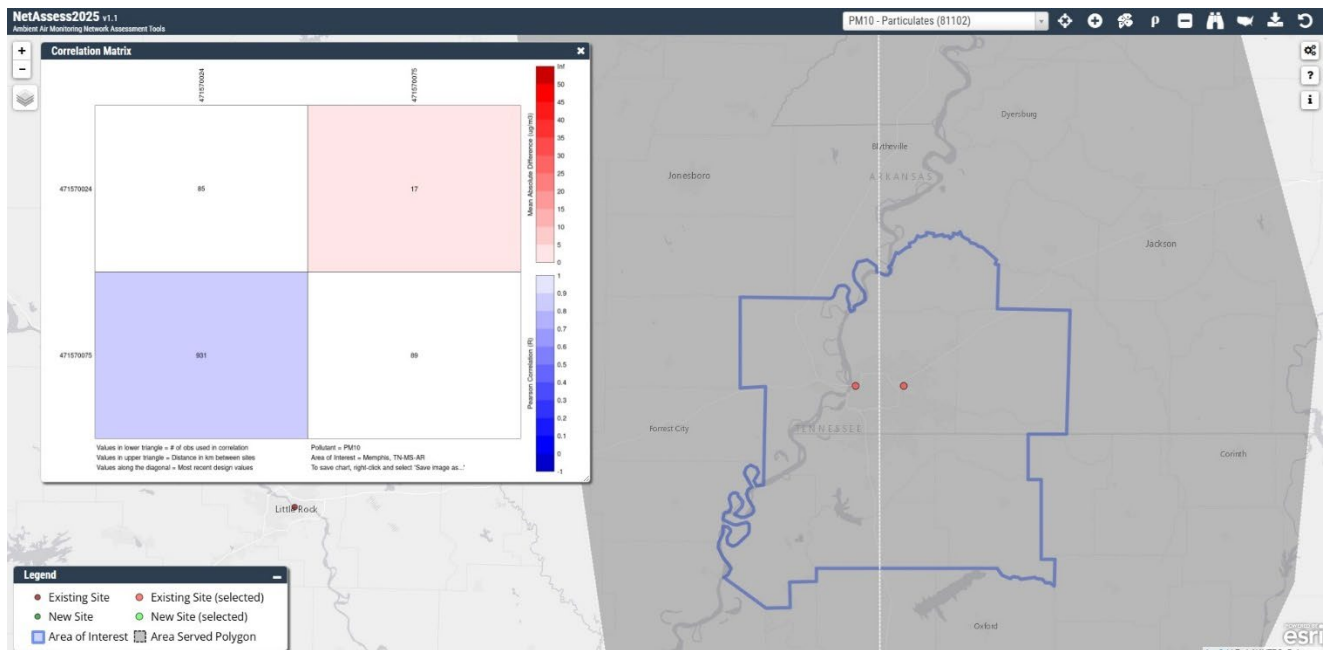


Figure 52. Memphis CBSA air monitoring PM₁₀ network correlation data. Graph is made with the NetAssess2025 tool.

5.6.3 2020 National Emissions Inventory for PM₁₀

Figure 53 shows the location of PM₁₀ point sources in Shelby County from the 2017 NEI (the 2020 map tool was not available). Table 20 lists the 2020 emissions inventory of PM₁₀. Title V point sources are defined as sources with a potential to emit more than 100 tons per year of a regulated NAAQS pollutant, more than 10 tons per year of at least one hazardous air pollutant (HAP) or more than 25 tons per year of all HAPs combined. Note: At the time of this report, the 2023 NEI was not yet available.

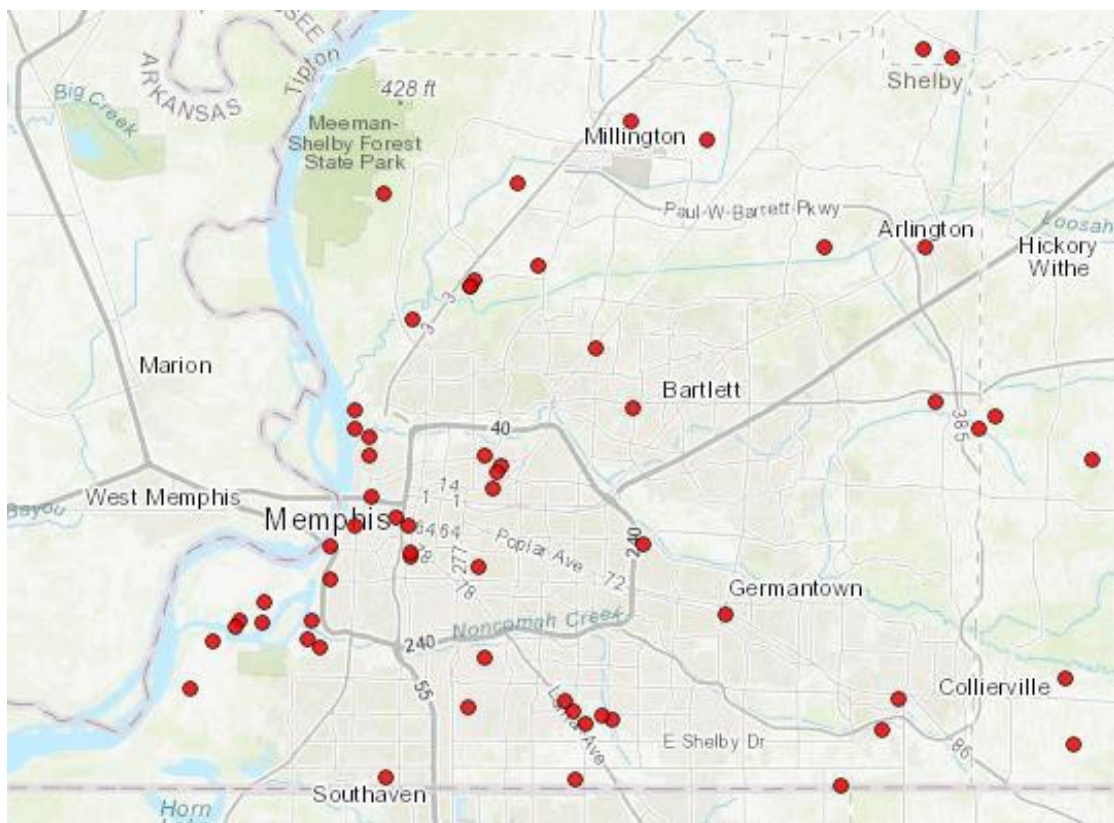


Figure 53. Map of facilities in Shelby County for 2017 PM₁₀ in Shelby County for (2020 Map unavailable). Table 20 data is extracted from EPA 2020 NEI website.

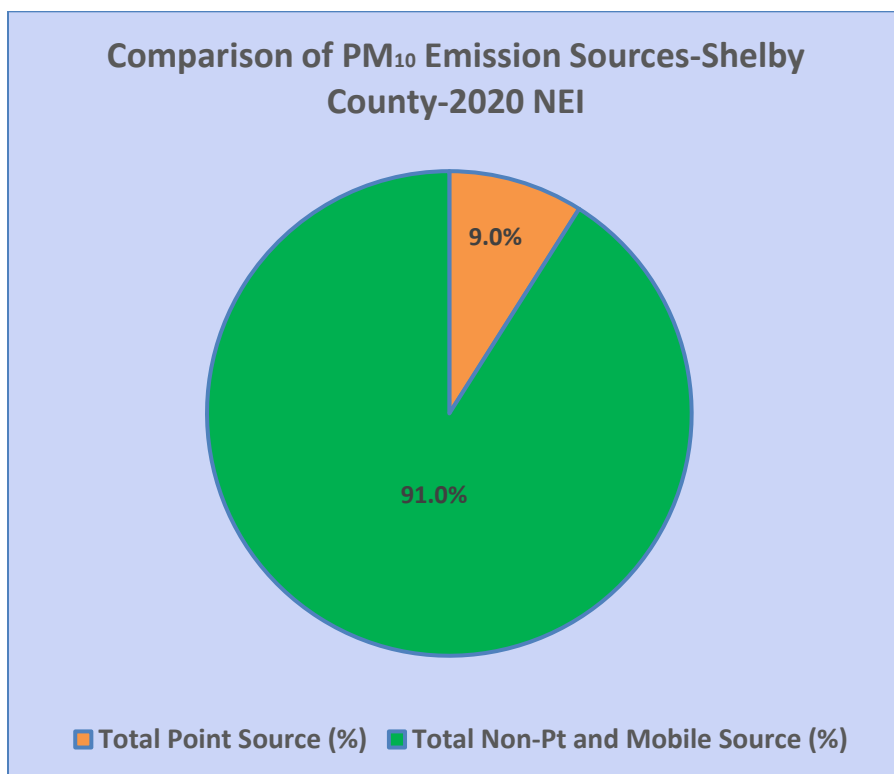


Figure 54. Percentage Comparison of Point Sources to Mobile/Non-Point Sources of PM₁₀ in Shelby County, Tennessee. Data compiled from EPA 2020 NEI.

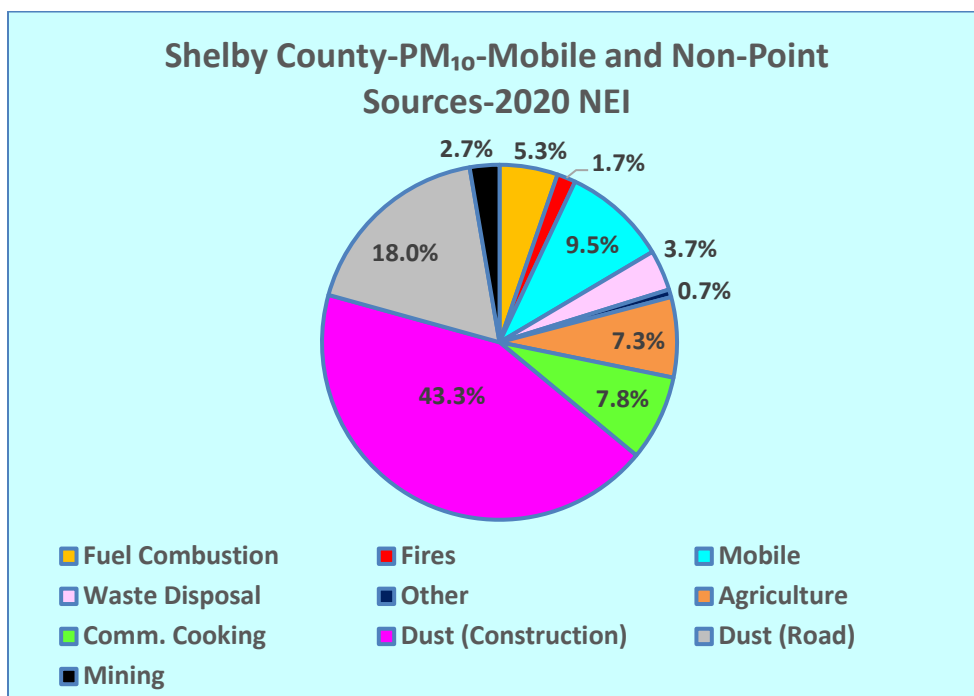


Figure 55. Percentage Comparison of PM₁₀ Mobile/Non-Point Sources in Shelby County, Tennessee. Data compiled from EPA 2020 NEI.

Table 19. 2020 National Emissions Inventory for PM₁₀ in Shelby County

PM 10 Sources in Shelby County, TN	PM 10 Emissions (Tons/Yr)	EIS ID	Address	NAICS Code
Valero Refining Co.	266.91294	7156111	543 West Mallory Ave	32411
Archer Daniels Midland Company (ADM)	115.377	6443711	2782 Chelsea Ave	311224
Nucor Steel Memphis Inc.	103.0489	12569611	3601 Paul R. Lowry Rd	331111
TVA Allen Combined Cycle Plant	90.92975	18912511	2480 Hennington Ave.	221112
KTG-USA	79.7037	10693611	400 Mahannah Ave	322291
Solae, LLC	48.5071	5863711	4272 S Mendenhall	311224
Cargill Corn Milling	46.63004	5723011	2330 Buoy St	311221
E I Dupont De Nemours & Company Inc.	22.0739	4963911	2751 Fite Rd	325180
Memphis International Airport	16.43128	9171111	2491 Winchester Rd	488119
South Shelby Landfill	14.28336	2845911	5494 Malone Rd	562212
PMC Biogenix	11.90106	5706111	1231 Pope St	325992
Owens Corning Trumbull Asphalt Plant	11.52055	4980311	2301 Channel Ave	324122
Buckeye Technologies Inc.	10.39455	4963611	1001 Tillman St	32211
Atofina Chemicals, Inc.	6.43418	5721411	2571 Fite Rd	325180
North Shelby Landfill	6.15858	2845611	7111 Old Millington Rd	562212
FedEx Memphis AOC (Air Operations Complex)	5.55597	5720211	2903 Sprankel	49211
PennAKem	5.51739	5611311	3324 Chelsea Ave.	325199
Memphis (Railyard)	5.02863	19756111		482111
CN-Memphis (Harrison) Railyard	4.2557	14461311	670 W. Alcy Rd	482111
Millington Municipal Airport	4.1288	9171011	1201 Hornet Ave (Millington)	488119
Plaskolite Tennessee, LLC	1.86	18912311	2609 Fite Rd.	326199
General Dewitt Spain Airport	1.79231	9171211	2787 N 2nd St.	488119
Charles W. Baker Airport	1.70448	9172911	3870 Fite Rd (Millington)	488119
Blues City Brewery LLC	1.50846	4965611	5151 E. Raines Rd	31212
Conagra Foods Grocery Group/Wesson	1.3021	6443611	1351 Williams Ave	311224
SFI of Tennessee	1.22059	18912311	4768 Hungerford Rd	336370
Carrier Corporation	1.15191	4963711	97 Byhalia Rd	333415
St. Jude Children's Research Hospital	0.74415	2846011	262 Danny Thomas Place	622110
AB Mauri Food Inc., dba Fleishmann's Yeast	0.33851	2844711	2743 Riverport Rd	311999
CSX-Leewood (Railyard)	0.24574	14461411	1493 N. Holmes St	482111
The Jordan Company	0.1876	2844411	4661 Burbank Rd	331318
Colonial Air Park Airport	0.17753	10939411	Collierville, TN	488119
The Bryce Company, LLC	0.15	7871111	276 S. Parkway W.	322220
Isle-A-Port Airport	0.04142	12228411	1720 Harbor Ave.	488119
Richardson Strip Airport	0.01775	12227111	Eads, TN	488119
TVA-Allen Fossil Plant	0.00553	5720111	2474 Plant Road	221112

5.6.4 Summary of Assessment for PM₁₀

(a) Need for New Monitoring Sites

The SCHD AMB PM₁₀ network is comprised of two monitoring stations (47-157-0024 and 47-157-0075). Station 47-157-0075 is an approved NCore site. The PM₁₀ monitoring network operated by the SCHD meets the monitoring requirements of 40 CFR Part 58 Appendix D. Although it is likely that the T640x planned to be installed at the Macon Cove-Near Road site will include PM₁₀, the 2024 design value shows the highest daily concentration value to be above 80%. The SCHD is adding Appendix A to show that transported Saharan dust significantly impacted the area monitors on the day with the highest daily PM₁₀ concentration in 2024. If necessary, the SCHD may petition the EPA to exclude that day from NAAQS consideration to avoid the requirement of an additional monitor.

(b) Need to Terminate Existing Sites

Each PM₁₀ site operated by the SCHD AMB serves a specific purpose. They are all necessary to monitor PM₁₀ concentration for Shelby County. These two stations should continue operating in the SCHD AMB network.

(c) New Technologies

Currently, there are two PM₁₀ instruments in the SCHD AMB monitoring network. There is a continuous PM₁₀ TEOM from Thermo Scientific Instrumentation, Inc. located at the Alabama Ave. site. Although Thermo technology is a proven Federal Equivalent Method (FEM) that should meet the monitoring requirements for the next five years, the SCHD AMB plans to replace the TEOM with newer technology using the Teledyne-API T640x. This replacement is expected later in 2025. Teledyne-API technology is also a proven Federal Equivalent Method (FEM) that should meet the monitoring requirements for the next five years. In addition, plans include the installation of another Teledyne-API T640x monitor at the Macon Cove-Near Road site. The Shelby Farms-NCore site has been operating a Teledyne-API T640x monitor since 2021.

The SCHD AMB PM₁₀ monitoring stations as discussed above meet the requirements of 40 CFR 58, Appendix D for monitoring objectives and monitor site types. The PM₁₀ monitoring stations operated by the SCHD AMB are located to determine expected maximum concentrations and to provide air quality concentration data in an area of high population density at the appropriate spatial scales. These stations meet the minimum requirements of the SCHD AMB monitoring network.

Monitoring network assessment indicates that the SCHD AMB does not currently (2020-2024) violate the EPA NAAQS. The highest priority for the SCHD AMB ambient air quality monitoring group is an accurate and reliable PM₁₀ monitoring network that is in full compliance with the requirements of 40 CFR Part 58 Appendix D.

6. Summary of 2020 Emissions in Shelby County

Pollution sources are roughly classified into 4 categories of sources: point, nonpoint, onroad, and nonroad. Each category contributes different portions of the total emissions for each pollutant. Total emissions of the particulate matter and the gas criteria pollutants are listed in Table 21. Generally, the monitoring network in Shelby County monitors the total mixed pollution effect, not a specific pollution source.

Table 20. 2020 Emission Inventory of All Sources in Shelby County

Sector/ Sub-Sector	2020 Shelby County, Tennessee Summary of Emissions Estimates - All Sectors Except Biogenic								
	CO	NOX	VOC	SO ₂	PM _{2.5} -PRI	PM _{2.5} -FIL	PM ₁₀ -PRI	PM ₁₀ -FIL	PM-CON
	(tons)	(tons)	(tons)	(tons)	(tons)	(tons)	(tons)	(tons)	(tons)
Point	4,152.6	3,671.2	2,848.6	470.4	709.5	462.9	887.2	638.1	215.3
Nonpoint	10,413.7	1,886.5	29,468.4	66.7	2,546.4	1,729.0	8,166.9	7,322.0	686.9
Onroad Mobile	48,650.0	6,925.7	3,025.8	30.5	226.7	-	654.3	-	-
Nonroad Mobile - Equipment	33,138.0	1,239.4	2,057.9	1.8	163.8	-	174.8	-	-
Nonroad Mobile - CMV	84.0	565.9	20.1	4.1	15.2	-	15.7	-	-
Nonroad Mobile - Locomotive	99.5	454.0	18.4	0.4	11.2	-	11.6	-	-
Total	96,537.8	14,742.7	37,439.2	573.9	3,672.8	2,191.9	9,910.5	7,960.1	902.2

7. Reference

1. Title 40 Code of Federal Regulations Part 58, Appendix D – Network Design Criteria Ambient Air Quality Monitoring, as of June 30, 2025.
2. U.S. Census Bureau. (2024, July 1). State & County Quickfacts: Shelby County, TN <http://quickfacts.census.gov/>.
3. EPA NetAssess2025 website, <https://rconnect-public.epa.gov/NetAssess2025/>
4. Shelby County 2025 Ambient Air Monitoring Plan
5. 2020 National Emissions Inventory website, <https://awsedap.epa.gov/public/single/?appid=20230c40-026d-494e-903f-3f112761a208&sheet=5d3fdda7-14bc-4284-a9bb-cfd856b9348d&opt=ctxmenu,currsel>