2020 Tennessee Annual Monitoring Network Plan

Tennessee Department of Environment and Conservation

Air Pollution Control Division

July 1, 2020

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Annual Air Monitoring Network Plan Acronym Glossary

AADT ..... Annual Average Daily Traffic
AMNP ..... Annual Monitoring Network Plan
AQI ..... Air Quality Index
AQS ..... Air Quality Subsystem
BAM ..... Beta Attenuation Monitor
CASTNET ..... Clean Air Status and Trends Network
CBSA ..... Core-Based Statistical Area
CFR ..... Code of Federal Regulations
CO ..... Carbon Monoxide
DAPC ..... Division of Air Pollution Control
DRR ..... Data Requirements Report
DV ..... Design Value
EFO ..... Environmental Field Office
EPA ..... Environmental Protection Agency
FEM ..... Federal Equivalent Method
FRM ..... Federal Reference Method
µg/m3 ..... Micro Grams per Cubic Meters
MSA ..... Metropolitan Statistical Area
NAAQS ..... National Ambient Air Quality Standards
NCO ..... Nashville Central Office
NCore ..... National Core Monitoring Station
NEI ..... National Emissions Inventory
NFO ..... Nashville Field Office
NPS ..... National Park Service
NO2 ..... Nitrogen Dioxide
NO_x ..... Nitrogen Oxides
NO_y ..... Reactive Oxides of Nitrogen
O_3 ..... Ozone
PAMS ..... Photochemical Assessment Monitoring Station
Pb ..... Lead
$PM_{2.5}$ ..... Particles with an average aerodynamic diameter of 2.5 microns or less
PM_{10} ..... Particles with an average aerodynamic diameter of 10 microns or less
PWEI ..... Population Weighted Emission Index
POC ..... Parameter Occurrence Code
ppb ..... Parts Per Billion
ppm ..... Parts Per Million
PQAO ..... Primary Quality Assurance Organization
PSD ..... Prevention of Significant Deterioration
SLAMS ..... State and Local Air Monitoring Stations
SO_2 ..... Sulfur Dioxide
SPM ..... Special Purpose Monitor
TEOM ..... Tapered Element Oscillating Microbalance
TDEC ..... Tennessee Department of Environment and Conservation
Tpy ..... Tons per year
TVA ..... Tennessee Valley Authority

Introduction to the 2020/21 Annual Monitoring Network Plan for Tennessee

The annual monitoring network plan (AMNP) that is presented in the following pages will address each of the requirements specified in the Code of Federal Regulations (CFR). An overview of the geography, general climate, wind patterns, and population trends are included to provide background information that will assist the reader in understanding the current air monitoring network and reasons for placement of the existing monitoring sites. The actual regulatory requirements that specify the number and placement of air monitoring sites are found in 40 CFR 58. The sections that provide this guidance are also included in the report as a reference to help better understand the actual monitoring needs in each area.

In many instances, the areas for which monitoring is required are based on population criteria in which population must be considered to allow for monitoring in the areas where populations may be affected or exposed to the various criteria pollutants of concern. Additional monitoring sites are needed to address impacts to communities where source-related emission density might be elevated. Other considerations must also be addressed when selecting and operating air monitoring sites. The local influences of some types of sources (roadway dust or emissions) may be factors that require monitoring sites to be spaced certain distances from those sources. In the case of near-road or roadway monitoring activities, the monitors must be located very close to the potential sources of mobile emissions.

The principal areas in Tennessee with air monitoring sites are depicted with a graphic showing the locations for each of the monitoring sites. The sites are further identified with a site number, an Air Quality Site Identification (AQSID) and the types of pollutants being monitored at each location. Tables containing the relevant information for each site are also included. The tables are provided in two sections following the location graphic and can be found within each area's section of the report and relieves the reader from searching tables at the end of the report for information about a given site.

Each of the four local programs operating an air monitoring network in Tennessee provided a separate annual review. The local program's annual monitoring network plan will be submitted at the same time as the State of Tennessee's annual air monitoring network plan. Where revisions were noted in the local networks, those revisions were added to the State's overall plan.

The State of Tennessee is required to evaluate the ambient air monitoring network each year in accordance with requirements specified in 40 CFR Subpart B 58.10 and 40 CFR 58 Appendix D. All ambient air monitoring sites are meeting these regulatory requirements. Air monitoring site evaluations can be found in Appendix G. The National Park Service (NPS) operates several air monitoring sites located within the Great Smoky Mountains National Park (GSMNP) and is responsible for the generation, review and validation of the data generated by these monitoring sites. The Environmental Protection Agency (EPA) has determined that these sites fall under the Primary Quality Assurance Organization (PQAO) oversight of the NPS and as such, are the responsibility of the NPS. As a courtesy, TDEC DAPC provides an overview of these sites in the Tennessee Annual Monitoring Network Plan.

Proposed Revisions to Tennessee's Ambient Air Monitoring Network

TDEC DAPC proposes no changes in the air monitoring network for 2020-21.

The Purpose of Tennessee's Ambient Air Monitoring Network

There are several criteria used to determine the need for ambient air quality monitoring. These criteria are as follows:

- EPA National Ambient Air Quality Standards (NAAQS) criteria pollutant monitoring network requirements for the NCore, formally NAMS (National Air Monitoring Site); SLAMS (State and Local Air Monitoring Site); and SPM (Special Purpose Monitoring) monitoring networks can be found in 40 CFR Appendix D to Part 58.
- The CFR sets forth as regulations the requirements for air quality monitoring to be implemented by the states and EPA. These requirements are primarily organized around population and emission density in each area with the number of required monitors and the distribution of the monitors within the networks specified by these regulations. Additionally, 40 CFR, Part 58, Appendix D specifies criteria that must be followed in designing the NCore and SLAMS networks. The EPA must approve design and/or modifications to these networks.
- Additional federal regulations also specify requirements for Prevention of Significant Deterioration (PSD) monitoring networks. This monitoring requirement is triggered as part of a PSD permit application review where there is no representative contemporaneous ambient air quality data for the area near the proposed PSD source site. Under these criteria, either pre or post construction monitoring may be required to be conducted in the area near the facility likely to be impacted (as determined by modeling) by emissions.
- Air quality monitoring must be conducted to alert citizens in given areas to elevated levels of air pollutants in cities or communities of designated population levels that are required to provide Air Quality Index (AQI) reports to the general public.
- Air quality monitoring is conducted to address the need for background air quality data.
- Special air quality monitoring studies are conducted based on identified needs for monitoring data in each area.
- Citizen complaints and enforcement investigations related to air quality are other reasons for air quality monitoring usually in or around a specific area related to the complaint or investigation.
- Where warranted, requests from citizens for special air monitoring studies are also a reason for air monitoring activities.
- The federal regulations also specify the frequency, method, location requirements, equipment, quality assurance procedures and reporting of data collected from the ambient air monitoring networks.

Pollutant-specific requirements for establishing the need for ambient monitoring and the number of required monitors is found in Appendix D. Currently, all areas in Tennessee and in Tennessee's CBSAs are fulfilling the requirements for operating each type of ambient monitor(s) as well as the requirements for reporting the AQI. This is being accomplished through a joint effort by the State of Tennessee and other agencies located within the State and its CBSAs.

The following sections detail how the various requirements found in 40 CFR Part 58 are being met and when relevant, by which criteria pollutant monitors. Individual monitors listed may belong to the State of Tennessee or to other agencies operating monitors in the state and its multi-state CBSAs.

Air Quality Index Reporting

The following table demonstrates how Tennessee is meeting the minimum requirements for AQI reporting for particles with an average aerodynamic diameter of 2.5 microns or less ($PM_{2.5}$) and O_3 (Ozone):

Metropolitan Statistical Area	2010 Census	2019 Census Est.	Required to Have AQI Reporting	Daily AQI/Air Quality Forecasts Provided
Chattanooga, TN-GA	528143	**565194**	**Yes**	**Yes**
Clarksville, TN-KY	273949	307820	No	Yes
Cleveland, TN	115788	124942	No	No
Jackson, TN	179694	178644	No	No
Johnson City, TN	198716	203649	No	Yes, based on the combined population of both areas.
Kingsport-Bristol-Bristol, TN-VA	309544	307202	No	
Knoxville, TN	814914	**869046**	**Yes**	**Yes**, in addition, the GSMNP has a separate AQI/Forecast provided.
Memphis, TN-MS-AR	1316100	**1346045**	**Yes**	**Yes**
Morristown, TN	136608	142749	No	Not specifically but is included in the Knoxville forecast.
Nashville-Davidson--Murfreesboro, TN	1646200	**1934317**	**Yes**	**Yes**

$PM_{2.5}$ Monitoring

The following table lists the currently active $PM_{2.5}$ monitoring sites that fulfill the minimum requirements found in 40 CFR Part 58, Appendix D for all MSAs in the state:

Metropolitan Statistical Area	Required Number of Monitors	Monitors (AQSID)
Chattanooga, TN-GA CBSA# 16860	1	13-295-0002 *
		47-065-0031
		47-065-4002 *
Knoxville, TN CBSA# 28940	2	47-009-0011
		47-093-0028 *
		47-093-1013 *
		47-093-1017
		47-093-1020
		47-105-0109 *
Memphis, TN-AR-MS CBSA# 32820	2	05-035-0005
		28-033-0002 *
		47-157-0024
		47-157-0075 *
		47-157-0100 *
Nashville, TN CBSA# 34980	2	47-037-0023 *
		47-037-0040
		47-165-0007*

* Site operates a collocated monitor

$PM_{2.5}$ Continuous Monitoring

The following table lists the currently active $PM_{2.5}$ monitoring sites that fulfill the minimum requirements found in 40 CFR Part 58, Appendix D for all MSAs in the state:

Metropolitan Statistical Area	Required Number of Monitors	Monitors (AQSID)
Chattanooga, TN-GA CBSA # 16860	1	47-065-4002 *
Knoxville, TN CBSA # 28940	1	47-009-0011
		47-093-1013 *
		47-105-0109 *
Memphis, TN-AR-MS CBSA # 32820	1	47-157-0100 *
Nashville, TN CBSA # 34980	1	47-037-0023 *
		47-037-0040
		47-165-0007 *

* Site operates a collocated monitor

PM2.5 Background and Transport Sites

The following sites meet the requirement for the State's operation of 1 background and 1 regional transport site:

Metropolitan Statistical Area	Required Number of Monitors	Monitors (AQSID)
Background	1	47-099-0003
Regional Transport	1	47-065-0031
		47-009-0101

PM_{10} Monitoring

PM_{10} monitoring is currently being conducted by Nashville's Metro Public Health Department of Davidson County and the Shelby County Health Department in Memphis. The minimum requirements for PM_{10} monitoring are met by a combination of EPA waivers and by the following sites:

Metropolitan Statistical Area	Required Number of Monitors	Monitors (AQSID)
Chattanooga, TN-GA CBSA# 16860	1	Waived
Knoxville, TN CBSA# 28940	1	47-093-1013 *
Memphis, TN-AR-MS CBSA# 32820	2	47-157-0024
		47-157-0075
Nashville, TN CBSA# 34980	2	47-037-0023
		Waived

*Site operates a collocated monitor

Ozone Monitoring

TDEC DAPC operates eight ozone monitoring sites. Information that is more detailed can be found in Appendix G. The following table outlines the monitors that satisfy the minimum number of ozone monitors required by 40 CFR Part 58, Appendix D, Section 4.1 in each MSA:

Metropolitan Statistical Area	Required Number of Monitors	Monitors (AQSID)
Chattanooga, TN-GA CBSA# 16860	2	47-065-1011
		47-065-4003
Clarksville, TN-KY CBSA# 17300	1	21-047-0006
		21-221-9991 *
Kingsport-Bristol-Bristol, TN-VA CBSA# 28700	1	47-163-2002
		47-163-2003
Knoxville, TN CBSA# 28940	2	47-001-0101
		47-009-0101
		47-009-0102
		47-093-0021
		47-093-1020
		47-105-0109
Morristown, TN CBSA# 34100	1	47-089-0002
Memphis, TN-AR-MS CBSA# 32820	2	05-035-0005
		28-033-0002
		47-157-0021
		47-157-0075
		47-157-1004
Nashville, TN CBSA# 34980	2	47-037-0011
		47-037-0026
		47-165-0007
		47-187-0106
		47-189-0103

* CASTNET site operated by EPA

Carbon Monoxide (CO) Monitoring

The requirement for CO monitoring is met in the Nashville CBSA by the CO monitor operating at the near-road site and in the Memphis, TN-AR-MS CBSA as outlined below:

Metropolitan Statistical Area	Required Number of Monitors	Monitors (AQSID)
Memphis, TN-AR-MS CBSA# 32820	1	47-157-0100
Nashville, TN CBSA# 34980	1	47-037-0040

Nitrogen Dioxide (NO_2) Monitoring

NO_2 monitoring requirements for operating near-road monitors are met for both the Nashville and the Memphis, TN-AR-MS CBSAs, as detailed below:

Metropolitan Statistical Area	Required Number of Monitors	Monitors (AQSID)
Memphis, TN-AR-MS CBSA# 32820	1	47-157-0100
Nashville, TN CBSA# 34980	1	47-037-0040
		47-037-0011

Area-wide NO_2 monitoring is also met in the same CBSAs, where the State of Arkansas operates the area-wide NO_2 monitor to satisfy the requirements for the Memphis, TN-AR-MS requirement. This site is operated as agreed to in a memorandum of agreement between Memphis and the states of Arkansas and Mississippi; the required sites are listed below:

Metropolitan Statistical Area	Required Number of Monitors	Monitors (AQSID)
Memphis, TN-AR-MS CBSA# 32820	1	05-035-0005

SO_2 Monitors

The minimum number of SO_2 monitors is determined by calculating the population weighted emissions index (PWEI) for each CBSA as defined in 40 CFR Part 58, Appendix D, Section 4.4 and detailed in Table 5. The following monitors satisfy the PWEI requirements for all CBSAs in the state:

Metropolitan Statistical Area	Required Number of Monitors	Monitors (AQSID)
Kingsport-Bristol-	1*	47-163-6001

Bristol, TN-VA CBSA# 28700		47-163-6002
		47-163-6003
		47-163-6004
Memphis, TN-AR-MS CBSA# 32820	1	47-157-0075
Nashville, TN CBSA# 34980	1	47-037-0011

*Additional SO_2 monitors are required by TN's State Implementation Plan

Lead (Pb) Monitoring:

The State operates a single lead monitoring site in Sullivan County, Tennessee near the currently shutdown Exide facility. This site is located within the boundary of the current Bristol lead maintenance area. The state is also required to operate a source-oriented lead sampler at the Commercial Metals Company (CMC) Steel US plant, formally Gerdau in Knoxville. This monitoring is being conducted by the Knox County Health Department. The requirements for lead sampling are met by the following sites:

Source	Required Number of Monitors	Monitors (AQSID)
Exide, Sullivan County	1	47-163-3004*
CMC (Gerdau), Knox County	1	47-093-0023
Burnside, Knox County	1	47-093-0027**

*Site operates a collocated monitor

**Request for removal submitted

National Core Monitoring Station

In October 2006, the United States EPA established the National Core (NCore) multi-pollutant monitoring network in its final amendments to the ambient air monitoring regulations for criteria pollutants (codified in 40 CFR parts 53 and 58). It is the expectation that each state will have at least one NCore site. Nationwide, approximately 50 sites will be in urban locations and 20 sites in rural areas. The multi-pollutant monitoring approach at NCore sites will benefit health assessments, emissions strategy development, and future monitoring efforts. By providing data users, such as researchers and policy makers, with a robust suite of collocated pollutant and meteorological data, NCore sites will better characterize the numerous chemical and physical interactions between pollutants than what is traditionally available at compliance-oriented monitoring sites. Shelby County operates the only required NCore site in Tennessee. This site is detailed in the Shelby County AMNP plan. The Look Rock rural NCore site is an optional site operated by NPS.

Near-Road Monitors:

There are currently two near-road sites in Tennessee, both operated in local program counties (Davidson and Shelby). The near-road monitoring network was initiated as part of the 2010 NO_2 NAAQS review and has become a multi-pollutant (CO, NO_2, NO, NO_x, $PM_{2.5}$) monitoring network. The EPA, in cooperation with state, local, and tribal air agencies, has tracked the installation of near-road NO2 monitoring stations across the country. As part of

this effort, the EPA has created a list of sites and captured critical meta-data about the sites, their target roads, and general operations. Additional information on near-road monitoring networks can be found at https://www3.epa.gov/ttnamti1/nearroad.html and in Monitoring Network Requirements.

Prevention of Significant Deterioration (PSD) monitoring:

The Prevention of Significant Deterioration (PSD) permitting program is a Clean Air Act preconstruction review program for new and modified major stationary sources of air pollution (e.g., power plants, manufacturing facilities). The program requires that the area where the source is located be classified as either in attainment or unclassifiable with the National Ambient Air Quality Standards (NAAQS). The NAAQS establishes maximum pollution concentration levels to protect public health and welfare from harmful levels of nitrogen oxides, ozone, sulfur dioxide, particulates, carbon monoxide, and lead. A PSD increment is the maximum allowable increase in concentration towards the NAAQS from the baseline concentration for a pollutant. The baseline concentration is set for each existing pollutant at the time that the first complete PSD permit application affecting the area is submitted. PSD increments prevent the air quality in clean areas from completely consuming remaining air quality to the level set by the NAAQS. This monitoring requirement is triggered when there is insufficient ambient air quality data necessary to determine compliance with the NAAQS. Under these criteria, either pre or post construction monitoring may be required to be conducted in the area near the facility being constructed.

Currently, TDEC DAPC does not operate any PSD monitors.

Clean Air Status and Trends Network (CASTNET)

The Clean Air Status and Trends Network (CASTNET) monitoring network is designed to measure air quality in rural areas year-round. CASTNET sites in Tennessee and the state's metropolitan statistical areas (MSAs) are managed by the EPA's Clean Air Markets Division and operated by an EPA contractor. There are three CASTNET sites in rural areas of Tennessee and Kentucky. The two CASTNET sites in Tennessee are as follows:

Table 1: CASTNET Sites in Tennessee Areas

Site	AQSID	County	Location	2017 2019 Ozone DV (ppm)
Edgar Evins (ESP127)	47-041-9991	DeKalb	Edgar Evins State Park, Smithville, TN 37166	0.060
Speedwell (SPD111)	47-025-9991	Claiborne	718 Russell Hill Rd, Speedwell, TN 37870	0.061

Monitoring Sites and Discussion

All TDEC DAPC-operated sites meet the siting criteria as found in Appendix E to 40 CFR Part 58 for probe and monitoring path for $PM_{2.5}$, O_3, Pb, and SO_2. These sites will be reevaluated annually for compliance with this criterion. These sites are part of the State of Tennessee ambient air monitoring criteria pollutant monitoring network and are operated to ensure continued compliance with Appendix D to 40 CFR Part 58 network design requirements. Current site evaluations with photographs, distance measurements and confirmation of meeting the siting criteria requirements are provided in Appendix G to this plan.

The individual monitoring sites below have graphs included of their daily measured parameters, displayed according to their respective daily design value statistic when applicable. Sites that have changed PM2.5 monitoring methods are depicted together. They are displayed according to their new and historical parameter occurrence code (POC). For $PM_{2.5}$ federal reference monitors (FRMs), POCs 1 and 2 are used and for federal equivalent $PM_{2.5}$ monitors (FEMs), POCs 3 and 4 are used.

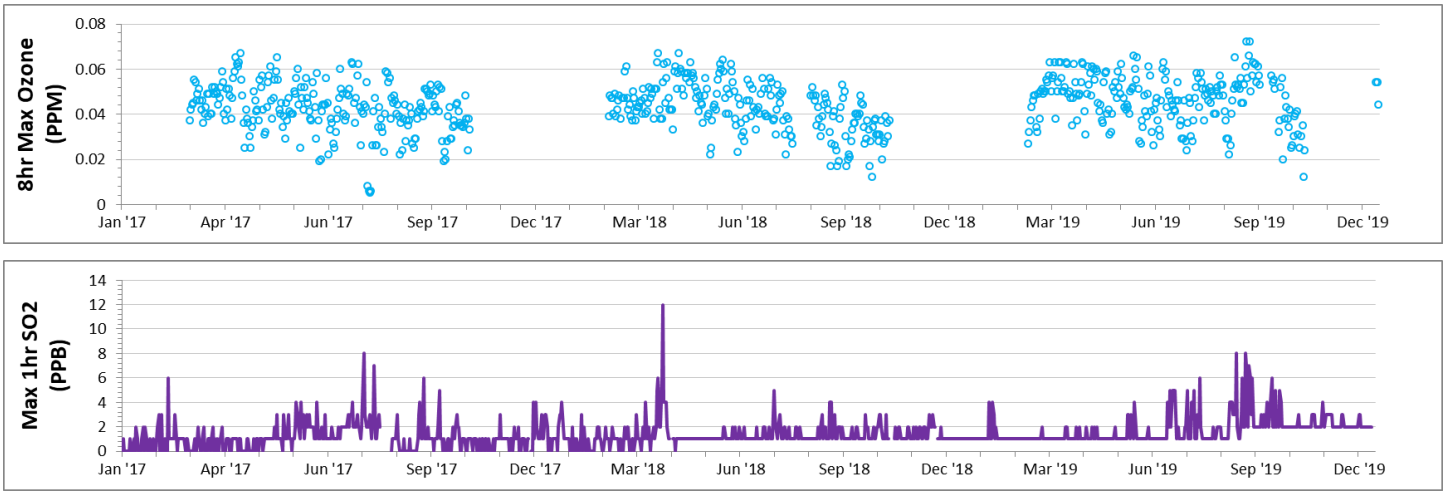
Freels Bend – Anderson County

Address	Freels Bend Study Area Melton Lake Oak Ridge
AQSID	47-001-0101
CBSA	28940
Lat, Lon	35.964969, -84.22317
Parameter Code	44201
Parameter Name	O_3
Monitor Type	SLAMS
POC	1
Int	W
Collection Frequency	Hourly
Method	087
FRM/FEM Instrument	Model T400 Ozone Analyzer
Analysis	Ultraviolet Absorption
Ref Mtd ID	EQOA-0992-087
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Urban Scale
Land Use Type	Forest
Location Setting	Rural

The Freels Bend site is in Anderson County, Tennessee and currently supports ambient air monitoring for ozone. The Freels Bend site was initially established in 1992 and is expected to operate during CY's 2020 and 2021. This site is located west of Knoxville and southeast of Oak Ridge, Tennessee. This site is an upwind site from the core Knoxville MSA. This site serves in assessing upwind ozone levels entering the Knoxville area. This site was determined to remain in operation over five years (2020 through 2025). The Knoxville MSA has six ozone sites and is required to have only two. This site is also employed in the air quality index (AQI) forecasting program and currently is attaining the standards for ozone.

This site previously monitored for SO_2 in addition to ozone but due to changes in SO_2 monitoring requirements, TDEC DAPC ended SO_2 monitoring on December 31, 2019.

Freels Bend Daily Air Quality

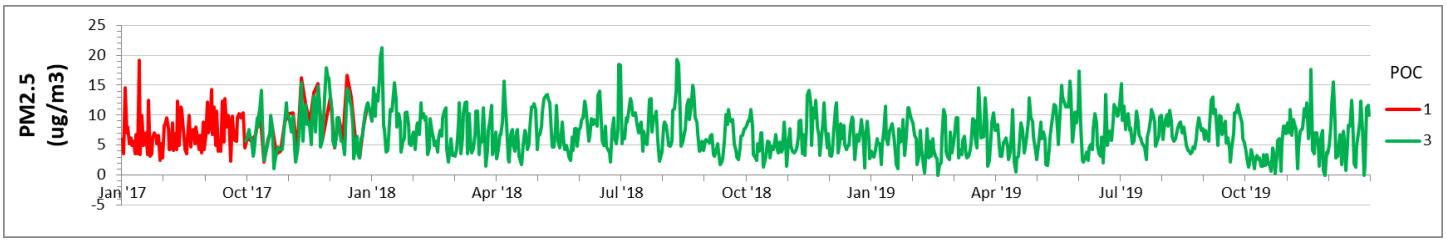


Maryville – Blount County

Address	2007 Sequoyah Avenue Maryville TN 37803
AQSID	47-009-0011
CBSA	28940
Lat, Lon	35.768847, -83.942152
Parameter Code	88101
Parameter Name	$PM_{2.5}$ Continuous
Monitor Type	SPM
POC	3
Int	1
Collection Frequency	Hourly
Method	209
FRM/FEM Instrument	Met One BAM 1022 FEM
Analysis	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	EQPM-1013-209
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Neighborhood
Land Use Type	Residential
Location Setting	Suburban

The Maryville site is in Blount County, Tennessee and currently supports ambient air monitoring for fine particulate matter. The site was initially established in 2000 and is expected to operate during CY's 2020 and 2021. This site is located south of Knoxville and northwest of the GSMNP. This site is an upwind site from the core Knoxville MSA. The Maryville $PM_{2.5}$ monitoring site began on May 1, 2000 as a part of the original $PM_{2.5}$ state network. Because of the importance this site serves in assessing the upwind $PM_{2.5}$ levels entering the Knoxville area, this site was determined to remain in operation over the next five years (2020 through 2025). The Knoxville MSA has six $PM_{2.5}$ sites and is only required to have two to meet the minimum requirements. This site is also employed in the AQI forecasting program and is used to help assess impacts from precursor transport into Tennessee from Georgia and North Carolina.

Maryville Daily Air Quality

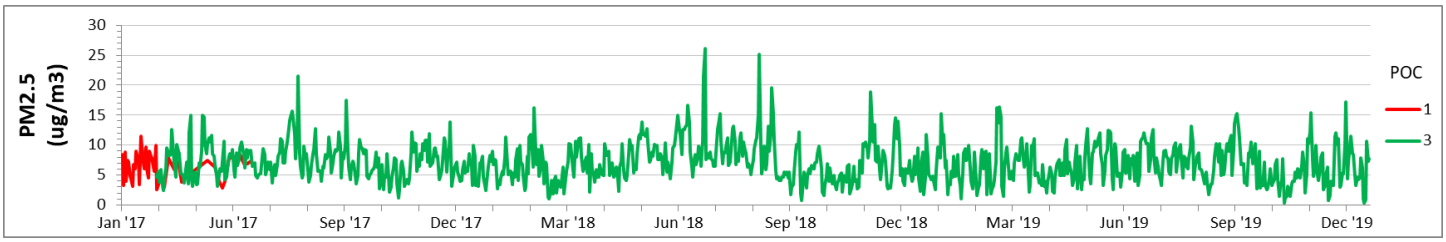


Dyersburg – Dyer County

Address	175-B Greenwood Street, Dyersburg TN 38024
AQSID	47-045-0004
CBSA	20540
Lat, Lon	36.05266, -89.382157
Parameter Code	88101
Parameter Name	$PM_{2.5}$ Continuous
Monitor Type	SLAMS
POC	3
Int	1
Collection Frequency	Hourly
Method	209
FRM/FEM Instrument	Met One BAM 1022
Analysis	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	EQPM-1013-209
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Neighborhood
Land Use Type	Residential
Location Setting	Suburban

The Dyersburg site is in Dyer County, Tennessee and currently supports ambient air monitoring for $PM_{2.5}$. The site was initially established in 1998 and is expected to operate during CY's 2020 and 2021. This site is located northwest of Jackson and north-northeast of Memphis, Tennessee. This site is downwind from the core Memphis MSA. Monitoring for $PM_{2.5}$ began at the Dyersburg site on August 22, 1998 as a part of the original $PM_{2.5}$ state network. Because of the importance this site serves in assessing the area $PM_{2.5}$ levels outside of the Memphis area, this site was determined to remain in operation over five years (2020 through 2025). This site is also employed in the AQI forecasting program and is used to help assess impacts from precursor transport into Tennessee from adjacent states.

Dyersburg Daily Air Quality

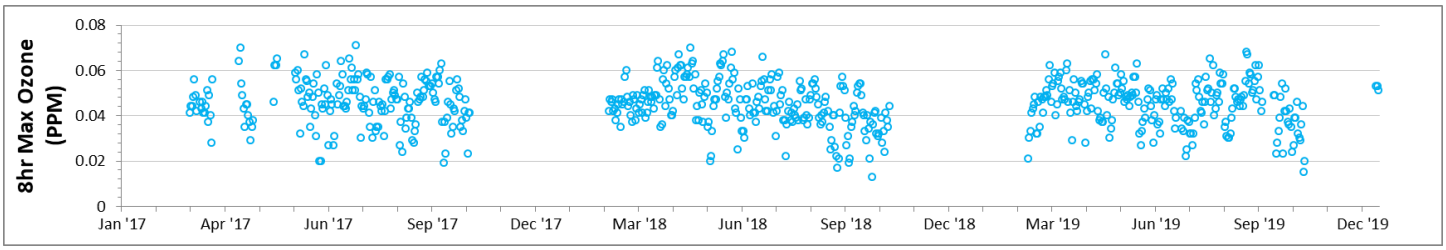


New Market – Jefferson County

Address	2393 Forester Rd, New Market, TN 37820
AQSID	47-089-0002
CBSA	34100
Lat, Lon	36.105629, -83.602077
Parameter Code	44201
Parameter Name	O_3
Monitor Type	SLAMS
POC	1
Int	W
Collection Frequency	Hourly
Method	087
FRM/FEM Instrument	Model T400 Ozone Analyzer
Analysis	Ultraviolet Absorption
Ref Mtd ID	EQOA-0992-087
Monitor Objective	Max Ozone Concentration
Dominant Source	Area
Measurement Scale	Urban
Land Use Type	Agricultural
Location Setting	Rural

The New Market site is in Jefferson County, Tennessee and currently supports ambient air monitoring for ozone. The site was initially established in 1999 and is expected to operate during CY's 2020 and 2021. This site is located east-northeast of Knoxville and west southwest of Morristown, Tennessee. This site is downwind from the core Knoxville MSA. Ozone monitoring began at the New Market site on March 1, 1999. This site is used with the ozone AQI forecasting program for verification and to help address transport downwind of the Knoxville MSA. This site meets the requirement for having 1 ozone site in the Morristown MSA. Because of the importance this site serves in assessing the area ozone levels outside and downwind of the Knoxville area, this site was determined to remain in operation over the next five years (2020 through 2025).

New Market Daily Air Quality

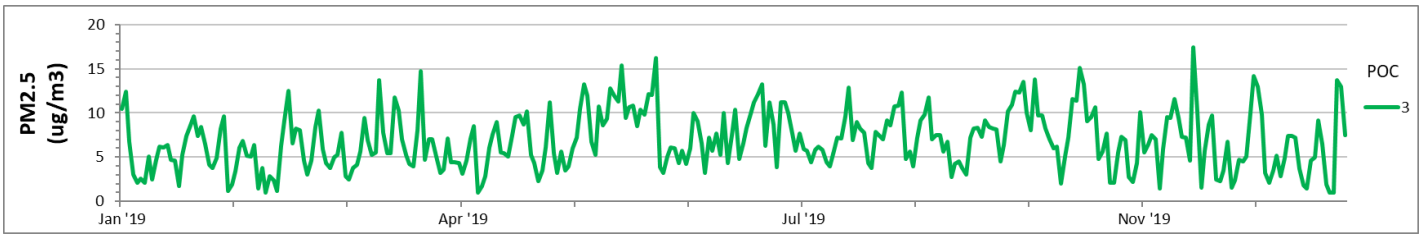


Loretto – Lawrence County (New)

Address	60 Busby Rd, Loretto, TN 38469
AQSID	47-099-0003
CBSA	29980
Lat, Lon	35.116878, -87.419725
Parameter Code	88101
Parameter Name	$PM_{2.5}$ Continuous
Monitor Type	SLAMS
POC	3
Int	1
Collection Frequency	Hourly
Method	209
FRM/FEM Instrument	Met One BAM 1022
Analysis	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	EQPM-1013-209
Monitor Objective	Upwind background, population exposure
Dominant Source	Area
Measurement Scale	Regional Scale
Land Use Type	Agricultural
Location Setting	Rural

The Loretto ambient air monitoring site is in Lawrence County, Tennessee and currently supports ambient air monitoring for $PM_{2.5}$. This site is located on the southern border of Tennessee, north of Alabama. The site is southwest of Nashville and southeast of Jackson, Tennessee. This site is part of the Nashville combined statistical area (CSA) and is in the Lawrenceburg micropolitan area (CBSA) in Tennessee. Loretto $PM_{2.5}$ ambient air monitoring began on January 14, 2019 and replaces the original ambient air $PM_{2.5}$ monitoring state site location at 355 Busby Rd, Loretto, TN 38469. The Loretto ambient air monitoring site is part of the $PM_{2.5}$ AQI forecasting program and serves as a background ambient air $PM_{2.5}$ monitoring site. It was determined to remain in operation over the next five years (2020 through 2025).

Loretto Daily Air Quality

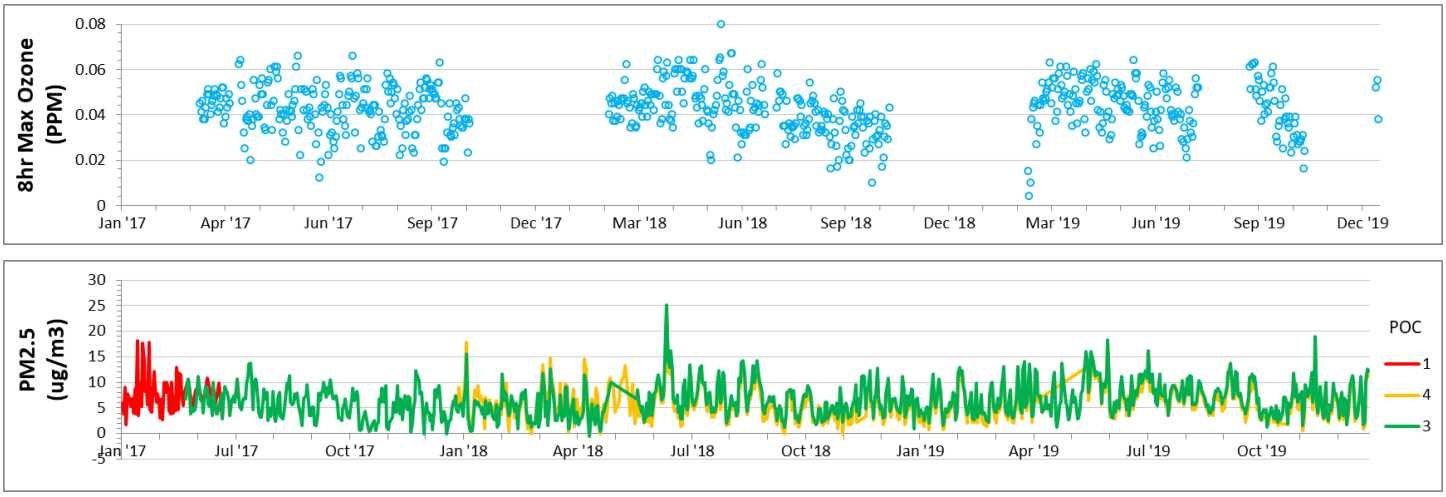


Loudon – Loudon County

Address	2175 Roberts Road, Loudon, TN 37774		
AQSID	47-105-0109		
CBSA	28940		
Lat, Lon	35.721095, -84.343035		
Parameter Code	44201	88101	88101
Parameter Name	O_3	$PM_{2.5}$ Continuous	$PM_{2.5}$ Continuous
Monitor Type	SPM	SLAMS	SLAMS
POC	1	3	4
Int	W	1	1
Year	2014	2017	2018
Collection Frequency	Hourly	Hourly	Hourly
Method	087	209	209
FRM/FEM Instrument	Model T400 Ozone Analyzer	Met One BAM 1022	Met One BAM 1022
Analysis	Ultraviolet Absorption	Real Time Beta Attenuation Mass Monitor	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	EQOA-0992-087	EQPM-1013-209	EQPM-1013-209
Monitor Objective	Population Exposure	Population Exposure	Population Exposure
Dominant Source	Area		
Measurement Scale	Neighborhood		
Land Use Type	Residential		
Location Setting	Suburban		

The Loudon site is located at 2175 Roberts Road, in Loudon County, TN 37774. The Loudon site supports ambient air monitoring for $PM_{2.5}$ and O_3. It is located southwest of Knoxville and northeast of Chattanooga. This site is upwind of the Knoxville MSA and downwind from the Chattanooga MSA. Monitoring for $PM_{2.5}$ began at the Loudon site on August 1, 2003 as a part of a Loudon air quality study and complaint investigation. Ozone monitoring began at the Loudon site in March of 2004. The Loudon site is serving as one of two collocated $PM_{2.5}$ ambient air monitoring sites. Monitoring at this site is used by the AQI forecasting program for verification for the Knoxville MSA and was determined to remain in operation over the next five years (2020 through 2025).

Loudon Daily Air Quality

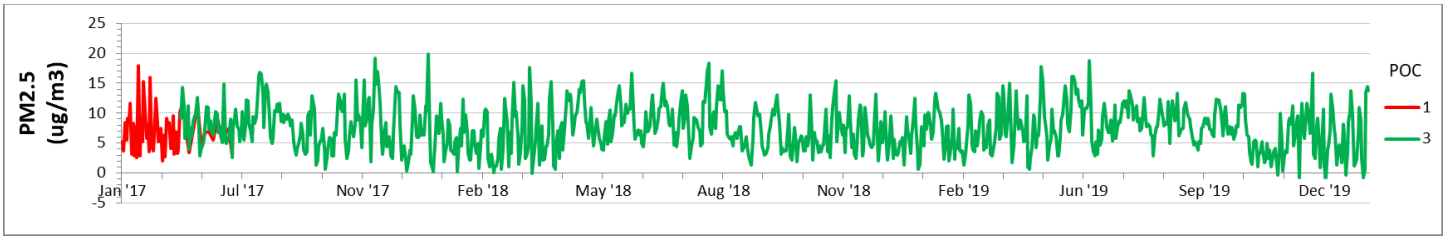


Athens – McMinn County

Address	Saint Mark AME Zion Church: 707 North Jackson St, Athens, TN 37303
AQSID	47-107-1002
CBSA	11940
Lat, Lon	35.450115, -84.596195
Parameter Code	88101
Parameter Name	$PM_{2.5}$ Continuous
Monitor Type	SPM
POC	3
Int	1
Collection Frequency	Hourly
Method	209
FRM/FEM Instrument	Met One BAM 1022
Analysis	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	EQPM-1013-209
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Neighborhood
Land Use Type	Commercial
Location Setting	Urban and Center City

The Athens site is in McMinn County, Tennessee and currently supports ambient air monitoring for $PM_{2.5}$. This site is located northeast of Chattanooga and southwest of Knoxville, Tennessee. It is downwind from the Chattanooga MSA and located in the Athens micropolitan area. $PM_{2.5}$ monitoring began at the Athens site on February 3, 2000 as a part of the original $PM_{2.5}$ state network. The FEM continuous $PM_{2.5}$ sampler replaced the FRM sampler on July 1, 2017 and is part of the $PM_{2.5}$ AQI forecasting program. This site was determined to remain in operation over 5 years (2020 through 2025). This site serves to help quantify air quality in this developing area of the state.

Athens Daily Air Quality

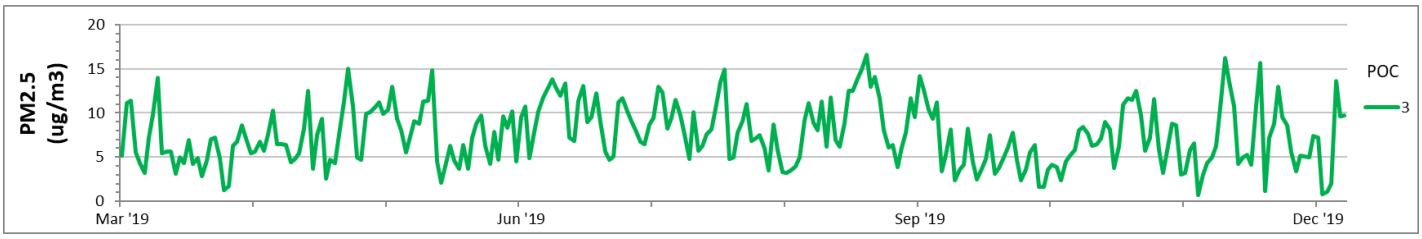


Jackson – Madison County (New)

Address	North Park Soccer Complex, 210 Demonbreun Drive, Jackson, TN 38305
AQSID	47-113-0010
CBSA	27180
Lat, Lon	35.705319, -88.81964
Parameter Code	88101
Parameter Name	$PM_{2.5}$ Continuous
Monitor Type	SLAMS
POC	3
Int	1
Collection Frequency	Hourly
Method	209
FRM/FEM Instrument	Met One BAM 1022
Analysis	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	EQPM-1013-209
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Neighborhood
Land Use Type	Residential
Location Setting	Suburban

The Jackson site is in Madison County, Tennessee and currently supports ambient air monitoring for $PM_{2.5}$. This site is located northeast of Memphis, southeast of Dyersburg and is part of the Jackson MSA in Tennessee. Monitoring for $PM_{2.5}$ began at the new Jackson site began on March 26, 2019 and replaces the original Jackson ambient air $PM_{2.5}$ monitoring state site location at 1371-A North Parkway, Jackson, TN 38301. The Jackson MSA has a single FEM continuous $PM_{2.5}$ sampler and is a supplemental SLAMS $PM_{2.5}$ site. This site was determined to remain in operation over the next five years (2020 through 2025) primarily because it provides valuable upwind $PM_{2.5}$ data for the Nashville AQI forecast.

Jackson (New) Daily Air Quality

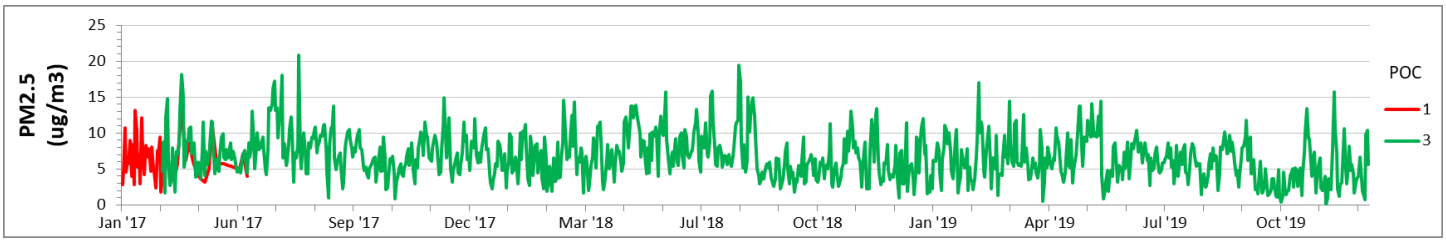


Columbia – Maury County

Address	1600 Nashville Hwy, Columbia, TN
AQSID	47-119-2007
CBSA	34980
Lat, Lon	35.65188, -87.0096
Parameter Code	88101
Parameter Name	$PM_{2.5}$ Continuous
Monitor Type	SPM
POC	3
Int	1
Collection Frequency	Hourly
Method	209
FRM/FEM Instrument	Met One BAM 1022
Analysis	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	EQPM-1013-209
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Neighborhood
Land Use Type	Commercial
Location Setting	Urban and Center City

The Columbia site is in Maury County, Tennessee and currently supports ambient air monitoring for $PM_{2.5}$. This site is located south-southwest of Nashville and northwest of Lewisburg, Tennessee. This site is located upwind within the Nashville MSA. $PM_{2.5}$ monitoring began at the Columbia site on December 25, 1998 as a part of the original $PM_{2.5}$ state network. The FEM continuous $PM_{2.5}$ sampler replaced the FRM sampler on July 1, 2017. This site was determined to remain in operation over the next five years (2020 through 2025) primarily because it is the only $PM_{2.5}$ site in this region.

Columbia Daily Air Quality

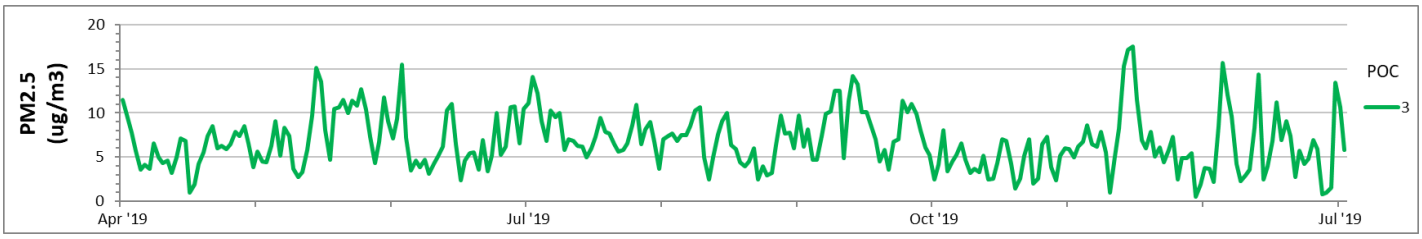


Clarksville – Montgomery County (New)

Address	1200 West Creek Coyote Trail, Clarksville, TN
AQSID	47-125-2001
CBSA	17300
Lat, Lon	36.611411, -87.384666
Parameter Code	88101
Parameter Name	$PM_{2.5}$ Continuous
Monitor Type	SLAMS
POC	3
Int	1
Collection Frequency	Hourly
Method	209
FRM/FEM Instrument	Met One BAM 1022
Analysis	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	EQPM-1013-209
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Neighborhood
Land Use Type	Residential
Location Setting	Suburban

The Clarksville site is in Montgomery County, Tennessee and currently supports ambient air monitoring for $PM_{2.5}$. This site is located within the Clarksville city limits northwest of Nashville, Tennessee, and is located within the Clarksville, TN-KY MSA. Monitoring for $PM_{2.5}$ at 1200 West Creek Coyote Trail, Clarksville, TN began on April 3, 2019. It replaces the original Clarksville ambient air $PM_{2.5}$ monitoring site location at 1514 Golf Club Ln, Clarksville, TN 37043 as a part of the state $PM_{2.5}$ monitoring network. This site assists with the $PM_{2.5}$ AQI forecasting program. The Clarksville MSA has a single FEM continuous $PM_{2.5}$ sampler that is a supplemental SLAMS $PM_{2.5}$ site for the MSA. The new site will remain in operation over the next five years (2020 through 2025) primarily because it is the only continuous $PM_{2.5}$ site in the MSA.

Clarksville (New) Daily Air Quality

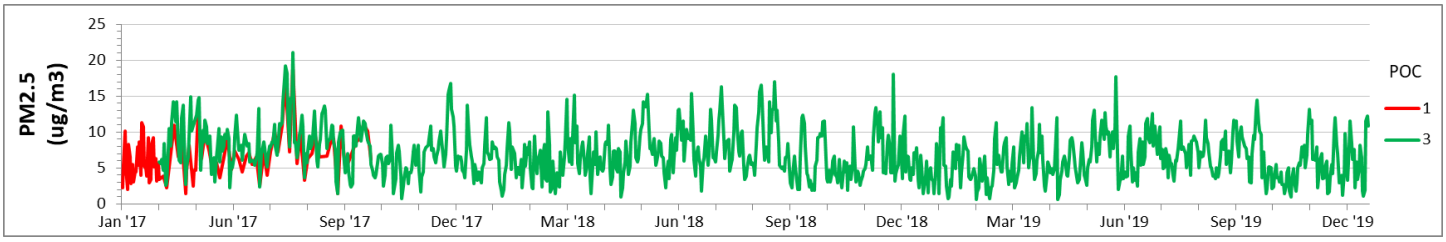


Cookeville – Putnam County

Address	630 East 20th Street, Cookeville TN 38501
AQSID	47-141-0005
CBSA	18260
Lat, Lon	36.185702, -85.492107
Parameter Code	88101
Parameter Name	$PM_{2.5}$ Continuous
Monitor Type	SPM
POC	3
Int	1
Collection Frequency	Hourly
Method	209
FRM/FEM Instrument	Met One BAM 1022
Analysis	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	EQPM-1013-209
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Neighborhood
Land Use Type	Residential
Location Setting	Suburban

The Cookeville site is in Putnam County, Tennessee and currently supports ambient air monitoring for $PM_{2.5}$. This site is located east of Nashville, on the Highland Rim, just west of the Cumberland Plateau. It is not located in or near an MSA but is within the largest micropolitan statistical area in the state. $PM_{2.5}$ monitoring began at the Cookeville site on August 15, 2006 after the site was relocated. This site was determined to remain in operation over the next five years (2020 through 2025) primarily because it is the only $PM_{2.5}$ site in this region.

Cookeville Daily Air Quality

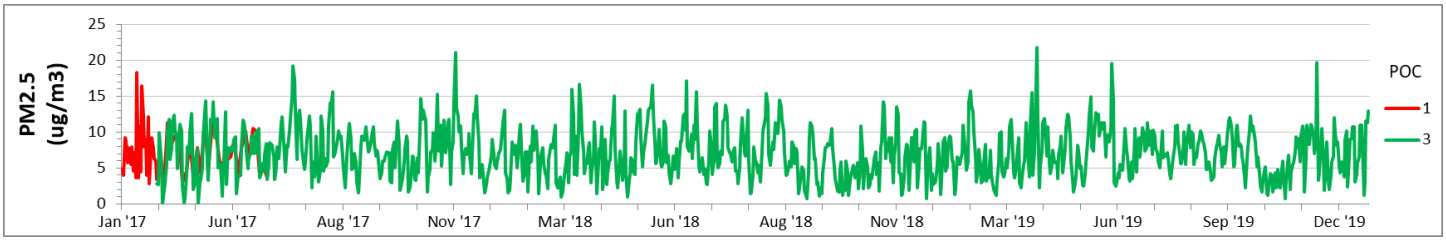


Harriman – Roane County

Address	Harriman High: 1002 N. Roane St., Harriman, TN 37748
AQSID	47-145-0004
CBSA	28940
Lat, Lon	35.939078, -84.542802
Parameter Code	88101
Parameter Name	$PM_{2.5}$ Continuous
Monitor Type	SPM
POC	3
Int	1
Collection Frequency	Hourly
Method	209
FRM/FEM Instrument	Met One BAM 1022
Analysis	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	EQPM-1013-209
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Urban
Land Use Type	Industrial
Location Setting	Suburban

The Harriman site is in Roane County, Tennessee and currently supports air monitoring for $PM_{2.5}$. This site is located west of Knoxville and west-southwest of Oak Ridge, Tennessee. It is upwind from the Knoxville MSA. $PM_{2.5}$ monitoring began at the Harriman site on January 1, 1998 as a part of the original $PM_{2.5}$ state network. This site is also part of the $PM_{2.5}$ AQI forecasting program. This site was determined to remain in operation over the next five years (2020 through 2025). The Knoxville MSA has five operating $PM_{2.5}$ FRM sites and is required to have two $PM_{2.5}$ monitoring sites.

Harriman Daily Air Quality

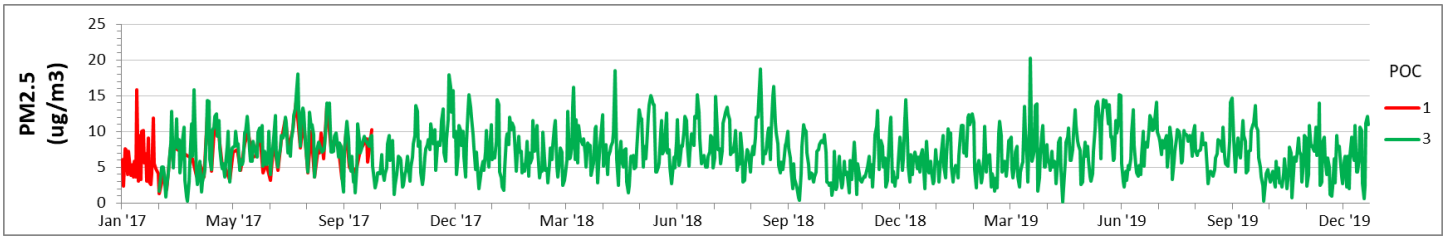


Kingsport ($PM_{2.5}$) – Sullivan County

Address	1649 D Street Kingsport TN 37664
AQSID	47-163-1007
CBSA	28700
Lat, Lon	36.538761, -82.521599
Parameter Code	88101
Parameter Name	$PM_{2.5}$ Continuous
Monitor Type	SLAMS
POC	3
Int	1
Collection Frequency	Hourly
Method	209
FRM/FEM Instrument	Met One BAM 1022
Analysis	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	EQPM-1013-209
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Urban
Land Use Type	Residential
Location Setting	Suburban

The Kingsport site is in Sullivan County, Tennessee and currently supports ambient air monitoring for $PM_{2.5}$. This site is in the far northeast corner of the state and is south of the state of Virginia. This site is upwind of Bristol, TN-VA and located within the Kingsport-Bristol-Bristol, Tennessee-Virginia MSA, in the Kingsport city limits. $PM_{2.5}$ monitoring began at the Kingsport site on October 1, 1998 as a part of the original $PM_{2.5}$ state network. It is also part of the $PM_{2.5}$ AQI forecasting program. The Kingsport MSA has a single FEM continuous $PM_{2.5}$ sampler and is a supplemental SLAMS $PM_{2.5}$ site for the MSA. This site was determined to remain in operation over the next five years (2020 through 2025) primarily because it is the only $PM_{2.5}$ site in this region.

Kingsport ($PM_{2.5}$) Daily Air Quality

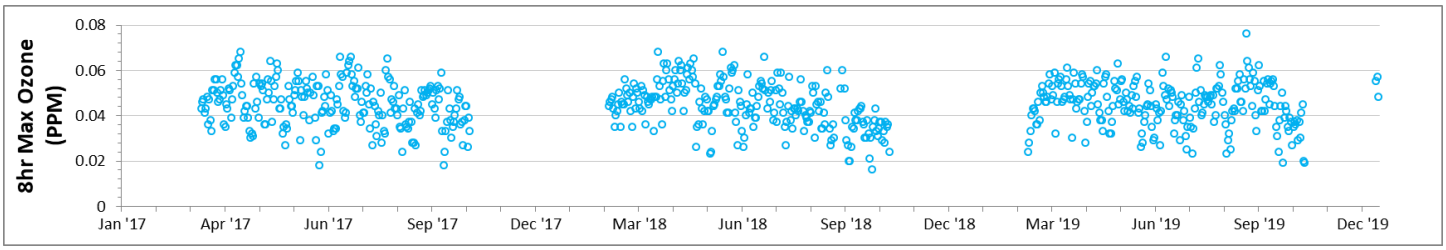


Blountville – Sullivan County

Address	Indian Springs School Shawnee Drive Blountville, TN 37664
AQSID	47-163-2002
CBSA	28700
Lat, Lon	36.541365, -82.424555
Parameter Code	44201
Parameter Name	O_3
Monitor Type	SLAMS
POC	1
Int	W
Collection Frequency	Hourly
Method	087
FRM/FEM Instrument	Model T400 Ozone Analyzer
Analysis	Ultraviolet Absorption
Ref Mtd ID	EQOA-0992-087
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Neighborhood
Land Use Type	Residential
Location Setting	Rural

The Blountville site is in Sullivan County, Tennessee and currently supports ambient air monitoring for ozone. It is located east of Kingsport, near Blountville, TN. This site is downwind from the city of Kingsport. Monitoring for ozone at the Blountville site began January 1, 1980 and is used with the ozone AQI forecasting program for verification and to help address the ozone impacts in the Kingsport-Bristol-Bristol Tennessee-Virginia and Johnson City MSAs. The Kingsport MSA has two ambient air ozone sites operating and is required to have only one ambient air ozone site. This site was determined to remain in operation over five years (2020 through 2025) primarily because of its location within the Kingsport-Bristol-Bristol MSA.

Blountville Daily Air Quality

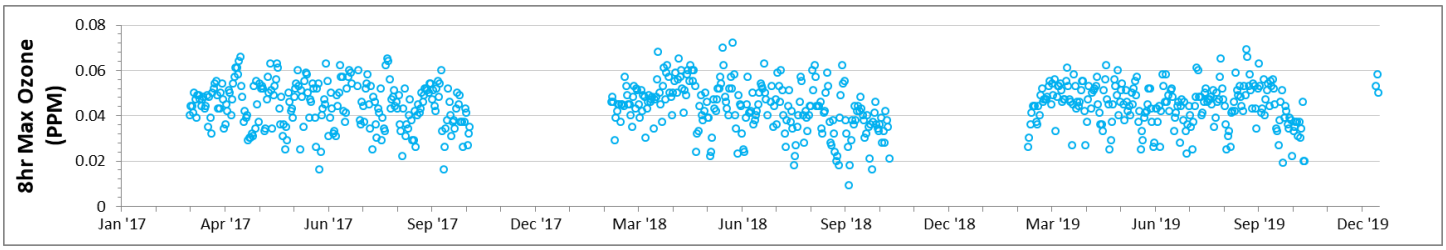


Kingsport O_3 – Sullivan County

Address	3301 Bloomingdale Rd. Kingsport TN 37660
AQSID	47-163-2003
County Name	Sullivan
CBSA	28700
Lat, Lon	36.58211, -82.485742
Parameter Code	44201
Parameter Name	O_3
Monitor Type	SLAMS
POC	1
Int	W
Collection Frequency	Hourly
Method	087
FRM/FEM Instrument	Model T400 Ozone Analyzer
Analysis	Ultraviolet Absorption
Ref Mtd ID	EQOA-0992-087
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Neighborhood
Land Use Type	Residential
Location Setting	Suburban

The Kingsport site is in Sullivan County, Tennessee and currently supports ambient air monitoring for ozone. It is in the far northeast corner of the state and is south of the State of Virginia near the Tennessee-Virginia line. This site is upwind of Gate City, VA and downwind of the Kingsport city limits. Kingsport is also a part of the Kingsport-Bristol-Bristol Tennessee-Virginia MSA and is conducted for the AQI forecasting program. Ozone monitoring began at the Kingsport site on April 1, 1995. The Kingsport MSA has two ambient air ozone sites operating and is required to have only one ambient air ozone site. This site was determined to remain in operation over the next five years (2020 through 2025) primarily because of its location within the Kingsport-Bristol-Bristol MSA.

Kingsport Daily Air Quality

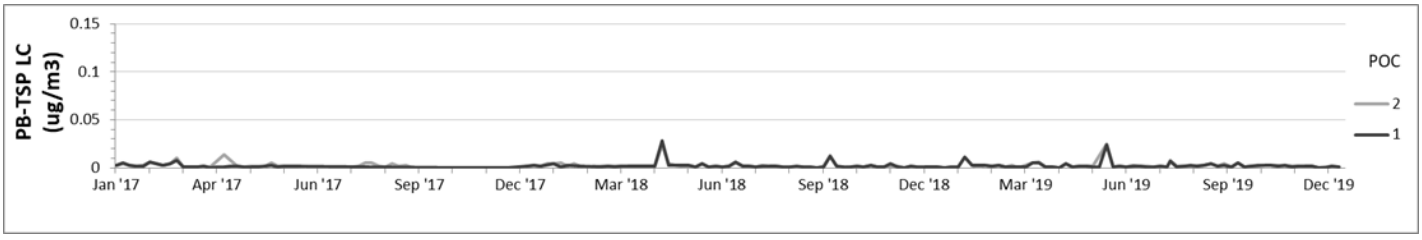


Exide – Sullivan County

Address	364 Exide Drive, Bristol TN 37620	
AQSID	47-163-3004	
County Name	Sullivan	
CBSA	28700	
Lat, Lon	36.524433, -82.27261	
Parameter Code	14129	14129
Parameter Name	Pb	Pb
Monitor Type	SLAMS	SLAMS
POC	1	2
Int	7	7
Collection Frequency	1 In 6	1 In 6
Method	193	193
FRM/FEM Instrument	Pb-TSP/ICP Spectra (ICP-MS)	Pb-TSP/ICP Spectra (ICP-MS)
Analysis	Inductively Coupled Plasma-Mass Spectrometry Acid Filter Extract with Hot Nitric Acid	Inductively Coupled Plasma-Mass Spectrometry Acid Filter Extract with Hot Nitric Acid
Ref Mtd ID	EQL-0512-201	EQL-0512-201
Monitor Objective	Source Oriented	
Dominant Source	Point	
Measurement Scale	Urban Scale	
Land Use Type	Industrial	
Location Setting	Urban and Center City	

The Exide site is in Sullivan County, Tennessee and currently supports ambient air monitoring for lead. It is located east of Kingsport and northeast of Blountville on the Tennessee Virginia state lines. This site is downwind from Johnson City and Blountville and is in the Kingsport Bristol MSA. Lead monitoring began at the Exide site on January 1, 2010 to verify lead NAAQS compliance at a lead battery plant that was shut down in 2013. The POC 2 monitor serves as the site's collocated monitor. This area is now classified as an attainment area for lead. The former lead source has surrendered its air permits on November 3, 2014 and has removed all lead processing emission sources.

Exide Daily Air Quality

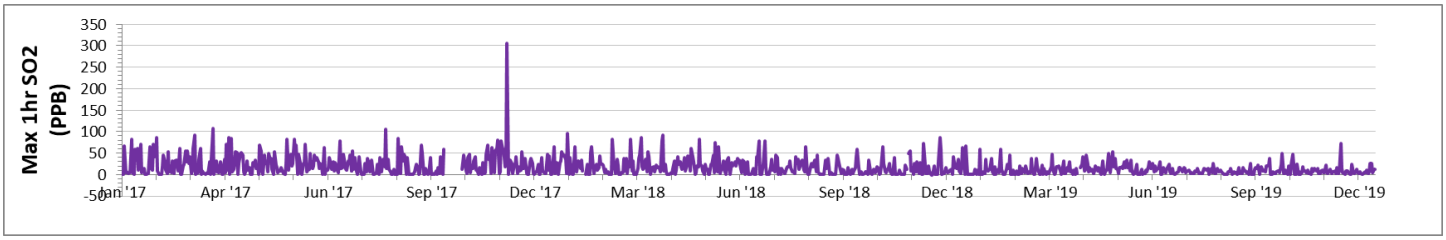


Ross N Robinson – Sullivan County

Address	Wilburn Drive, Kingsport, TN 37664
AQSID	47-163-6001
County Name	Sullivan
CBSA	28700
Lat, Lon	36.532616, -82.516306
Parameter Code	42401
Parameter Name	SO_2
Monitor Type	SLAMS
POC	1
Int	1
Collection Frequency	Hourly
Method	100
FRM/FEM Instrument	Teledyne T100 SO_2 Analyzer
Analysis	Ultraviolet Fluorescence
Ref Mtd ID	EQSA-0495-100
Monitor Objective	Source Oriented
Dominant Source	Point
Measurement Scale	Urban Scale
Land Use Type	Residential
Location Setting	Suburban

The Ross N Robinson site is in Sullivan County, Tennessee and currently supports ambient air monitoring for SO_2. The Ross N Robinson monitor is located within the 3-km SO_2 nonattainment area surrounding the Tennessee Eastman Chemical Plant and became operational in July 21, 2016. This monitoring site is operated to satisfy the PWEI requirements for the Kingsport, TN CBSA and secondly, as a part of a network of four SO_2 monitoring sites designed to characterize the maximum expected concentrations in the nonattainment area. Additional information can be found in Appendix F.

Ross N Robinson Daily Air Quality

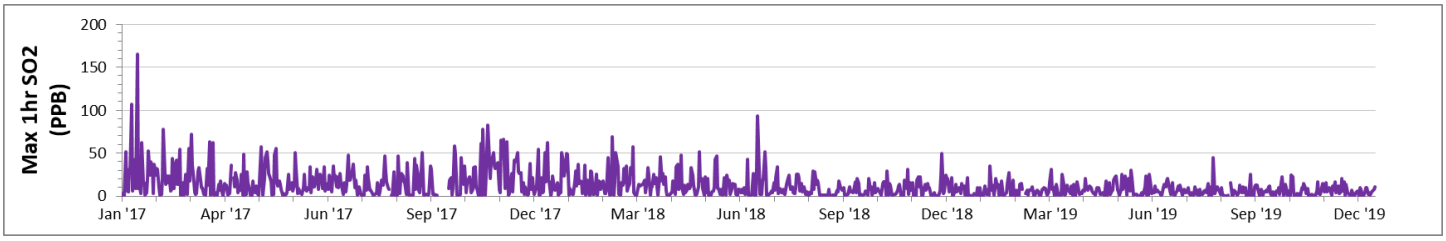


Skyland Dr. – Sullivan County

Address	Skyland Drive at Bagwell St., Kingsport, TN
AQSID	47-163-6002
County Name	Sullivan
CBSA	28700
Lat, Lon	36.521066, -82.502454
Parameter Code	42401
Parameter Name	SO_2
Monitor Type	SLAMS
POC	1
Int	1
Collection Frequency	Hourly
Method	100
FRM/FEM Instrument	Teledyne T100 SO_2 Analyzer
Analysis	Ultraviolet Fluorescence
Ref Mtd ID	EQSA-0495-100
Monitor Objective	Source Oriented
Dominant Source	Point
Measurement Scale	Urban Scale
Land Use Type	Residential
Location Setting	Suburban

The Skyland Drive ambient air monitoring site is in Sullivan County, Tennessee and currently supports ambient air monitoring for SO_2. The site is located within the 3-km SO_2 nonattainment area surrounding the Tennessee Eastman Chemical Plant and became operational in September 1, 2016. The site was established to characterize the maximum expected concentrations in the nonattainment area. This site is one of 4 sites in the Kingsport, TN CBSA designed to characterize the maximum expected concentrations in the nonattainment area. Additional information can be found in Appendix F.

Skyland Dr. Daily Air Quality

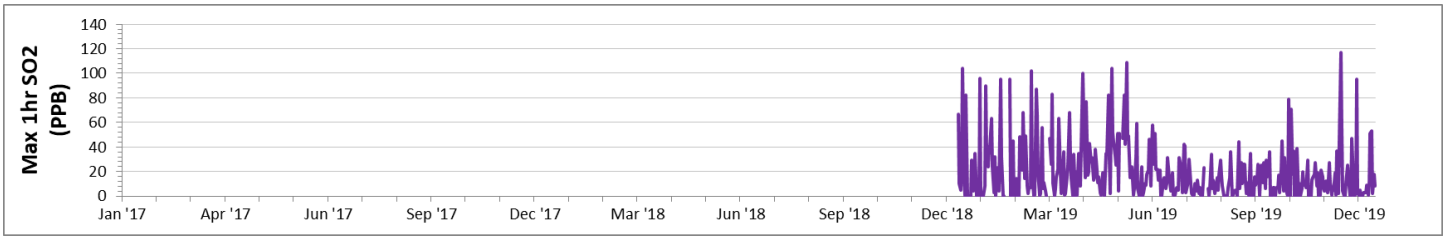


Andrew Johnson Elementary School – Sullivan County

Address	1001 Ormond Drive, Kingsport, TN
AQSID	47-163-6003
County Name	Sullivan
CBSA	28700
Lat, Lon	Lat: 36.526359; Long: -82.528677
Parameter Code	42401
Parameter Name	SO_2
Monitor Type	SLAMS
POC	1
Int	1
Collection Frequency	Hourly
Method	100
FRM/FEM Instrument	Teledyne T100 SO_2 Analyzer
Analysis	Ultraviolet Fluorescence
Ref Mtd ID	EQSA-0495-100
Monitor Objective	Source Oriented
Dominant Source	Point
Measurement Scale	Urban Scale
Land Use Type	Residential
Location Setting	Suburban

The Andrew Johnson Elementary School ambient air monitoring site is in Sullivan County, Tennessee and currently supports ambient air monitoring for SO_2. The site is located within the 3-km SO_2 nonattainment area surrounding the Tennessee Eastman Chemical Plant. This site began monitoring for SO_2 on January 1, 2019. This site is one of four sites in the Kingsport, TN CBSA designed to characterize the maximum expected concentrations in the nonattainment area. Additional information can be found in Appendix F.

Andrew Johnson Elementary School Daily Air Quality

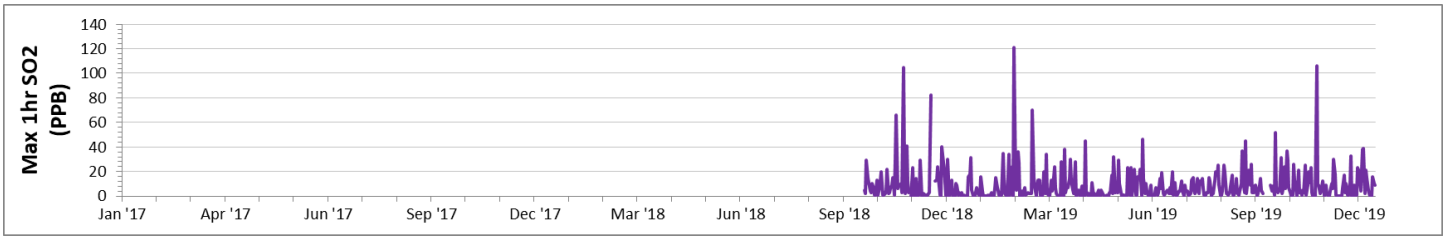


Happy Hill – Sullivan County

Address	2105 Happy Hill Road, Kingsport, TN
AQSID	47-163-6004
County Name	Sullivan
CBSA	28700
Lat, Lon	Lat: 36.513026; Long: -82.550498
Parameter Code	42401
Parameter Name	SO_2
Monitor Type	SLAMS
POC	1
Int	1
Collection Frequency	Hourly
Method	100
FRM/FEM Instrument	API Model 100 E SO_2 Analyzer
Analysis	Ultraviolet Fluorescence
Ref Mtd ID	EQSA-0495-100
Monitor Objective	Source Oriented
Dominant Source	Point
Measurement Scale	Urban Scale
Land Use Type	Residential
Location Setting	Suburban

The Happy Hill Road ambient air monitoring site is in Sullivan County, Tennessee and currently supports ambient air monitoring for SO_2. The site is located within the 3-km SO_2 nonattainment area surrounding the Tennessee Eastman Chemical Plant. The Happy Hill Road site was established and operational in October 10, 2018 but officially began collecting data for NAAQS comparison on January 1, 2019. This site is one of four sites in the Kingsport, TN CBSA designed to characterize the maximum expected concentrations in the nonattainment area. Additional information can be found in Appendix F.

Happy Hill Daily Air Quality

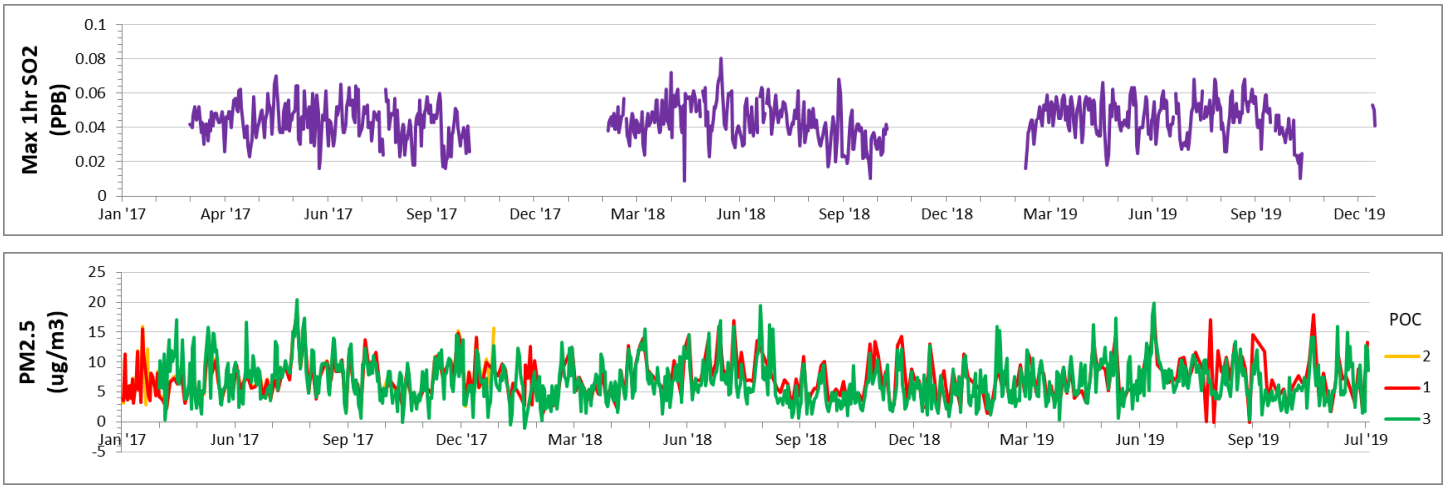


Hendersonville - Sumner County

Address	Rockland Recreational Area, Old Hickory Dam, Hendersonville, TN		
AQSID	47-165-0007		
CBSA	34980		
Lat	36.29756, -86.653137		
Parameter Code	44201	88101	88101
Parameter Name	O_3	$PM_{2.5}$	$PM_{2.5}$ Continuous
Monitor Type	SLAMS	SLAMS	SLAMS
POC	1	1	3
Int	W	7	1
Collection Frequency	Hourly	1 in 3	Hourly
Method	087	118	209
FRM/FEM Instrument	Model T400 Ozone Analyzer	R&P Co Plus Model 2025/2025i	Met One BAM 1022
Analysis	Ultraviolet Absorption	Gravimetric	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	EQOA-0992-087	RFPS-0498-118	EQPM-1013-209
Monitor Objective	Highest Conc	Population Exposure	
Dominant Source	Area	Area	
Measurement Scale	Urban	Urban	
Land Use Type	Industrial	Industrial	
Location Setting	Rural	Rural	

The Hendersonville site is in Sumner County, Tennessee and currently supports ambient air monitoring for ozone and $PM_{2.5}$. This site is located northeast of Nashville and west southwest of Gallatin, Tennessee. This site is downwind from Nashville and is considered part of the Nashville MSA. Ozone monitoring began on January 1, 1973 and is conducted for the ozone AQI forecasting program for verification and to help address NAAQS compliance in the Nashville MSA. Monitoring for $PM_{2.5}$ at the Hendersonville site began on October 1, 1998 as a part of the original $PM_{2.5}$ state network. This site is also part of the PM fine AQI forecasting program. An FEM continuous $PM_{2.5}$ sampler replaced the collocated FRM sampler on January 1, 2018. This site was determined to remain in operation over five years (2020 through 2025) primarily because it is the ozone DV site for the Nashville MSA and is downwind from the Nashville fine particulate precursor sources. The Nashville MSA has five ozone monitors operating and is only required to have two. On January 9, 2019 TDEC DAPC replaced the existing shelter with a new, upgraded shelter. The new shelter was placed in the same location as the existing shelter.

Hendersonville Daily Air Quality

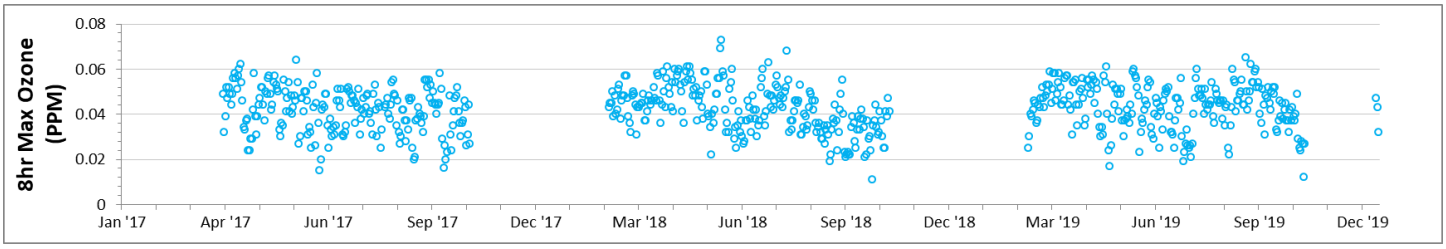


Fairview –Williamson County

Address	Fairview Middle School: 7200 Cumberland Dr, Fairview, TN
AQSID	47-187-0106
CBSA	34980
Lat, Lon	35.949765, -87.138246
Parameter Code	44201
Parameter Name	O_3
Monitor Type	SLAMS
POC	1
Int	W
Collection Frequency	Hourly
Method	087
FRM/FEM Instrument	Model T400 Ozone Analyzer
Analysis	Ultraviolet Absorption
Ref Mtd ID	EQOA-0992-087
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Urban Scale
Land Use Type	Agricultural
Location Setting	Rural

The Fairview site is in Williamson County, Tennessee and currently supports ambient air monitoring for ozone. It is located southwest of Nashville and northwest of Franklin, Tennessee. This site is upwind from the core Nashville MSA. Ozone monitoring at the Fairview site began on October 30, 2001 is conducted for the ozone AQI forecasting program for verification and to help address upwind ozone concentrations entering the Nashville MSA. The Nashville MSA has five ozone sites operating and is only required to have two ozone sites. Due to this site's importance in assessing the area ozone levels outside and upwind of the Nashville area, it was determined to remain in operation over the next five years (2020 through 2025).

Fairview Daily Air Quality

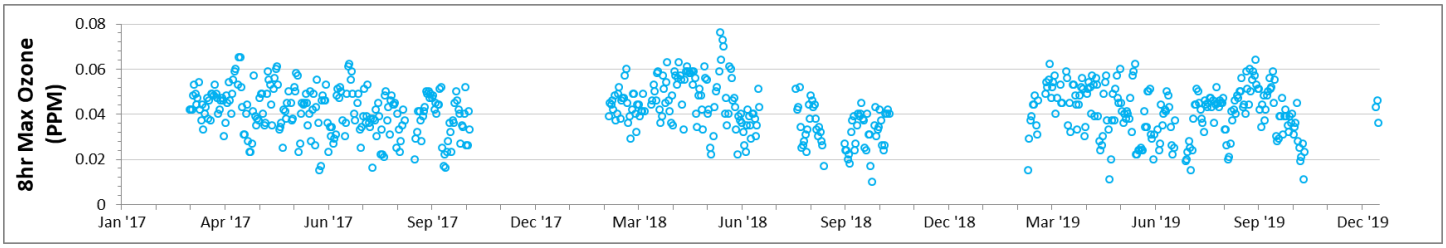


Cedars of Lebanon – Wilson County

Address	Cedar Forest Rd., Lebanon, TN
AQSID	47-189-0103
CBSA	34980
Lat, Lon	36.060895, -86.286291
Parameter Code	44201
Parameter Name	O_3
Monitor Type	SLAMS
POC	1
Int	W
Collection Frequency	Hourly
Method	087
FRM/FEM Instrument	Model T400 Ozone Analyzer
Analysis	Ultraviolet Absorption
Ref Mtd ID	EQOA-0992-087
Monitor Objective	Highest Concentration
Dominant Source	Area
Measurement Scale	Urban Scale
Land Use Type	Forest
Location Setting	Rural

The Cedars site is in Wilson County, Tennessee and currently supports ambient air monitoring for ozone. This site is located east of Nashville and north of Murfreesboro, Tennessee. This site is downwind from Murfreesboro, Tennessee and is located within the Nashville MSA. The Cedars site began monitoring for ozone on May 1, 1998 and supports the ozone AQI forecasting program for verification and to help address downwind ozone levels in the Nashville MSA. The Nashville MSA has five ozone sites operating and is only required to have two ozone sites. Because of the importance that this site serves in assessing the area ozone levels outside and downwind of the Nashville area, this site was determined to remain in operation over five years (2020 through 2025).

Cedars Daily Air Quality



National Park Service Monitors

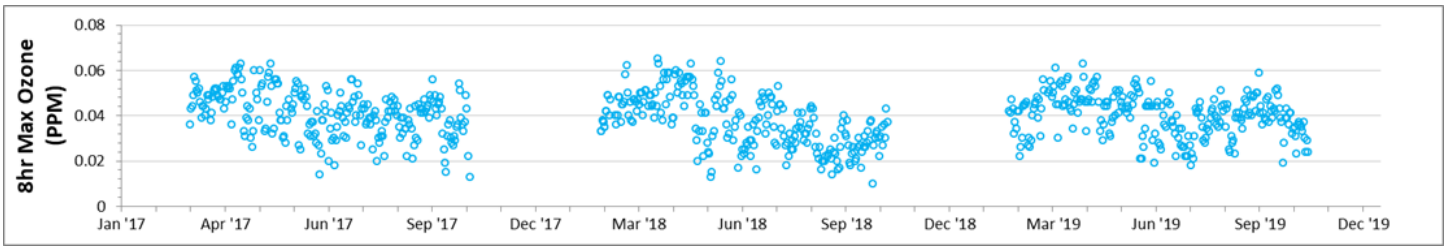
The NPS air monitoring sites are included as a courtesy to the readers of the TDEC DAPC 2020 AMNP. These sites are included because they are collecting, and reporting data previously used for attainment decisions in Tennessee and that can be used for future determinations. The NPS sites are not a part of the TDEC DAPC air monitoring networks and TDEC DAPC does not report their data to the EPA AQS data systems; however, these data may continue to be used to support air quality forecasting by TDEC in the area.

Cades Cove – Blount County (GSM NP)

Address	Great Smoky Mountains NP - Cades Cove
AQSID	47-009-0102
CBSA	28940
Lat, Lon	35.603056, -83.783611
Parameter Code	44201
Parameter Name	O_3
Monitor Type	Non-EPA Federal
POC	1
Int	W
Collection Frequency	Hourly
Method	53
FRM/FEM Instrument	Monitor Labs 8810
Analysis	Ultraviolet
Ref Mtd ID	EQOA-0881-053
Monitor Objective	Highest Concentration
Dominant Source	0
Measurement Scale	Regional Scale
Land Use Type	Forest
Location Setting	Rural

The Cades Cove site is in Blount County, Tennessee and currently supports ambient air monitoring for ozone and meteorological parameters. The Cades Cove site was initially established in May 1, 1994 and is located within the Tennessee portion of the Great Smoky Mountains National Park. This site is within and southeast of the Knoxville MSA. It is used with the ozone AQI forecasting program for verification and to help address ozone levels found in the GSMNP. It is the responsibility of the NPS to operate, maintain, and conduct all QA/QC activities at this site in accordance with 40 CFR Part 58. The National Park Service is responsible for verifying, validating, and certifying the ozone data collected.

Cades Cove Daily Air Quality

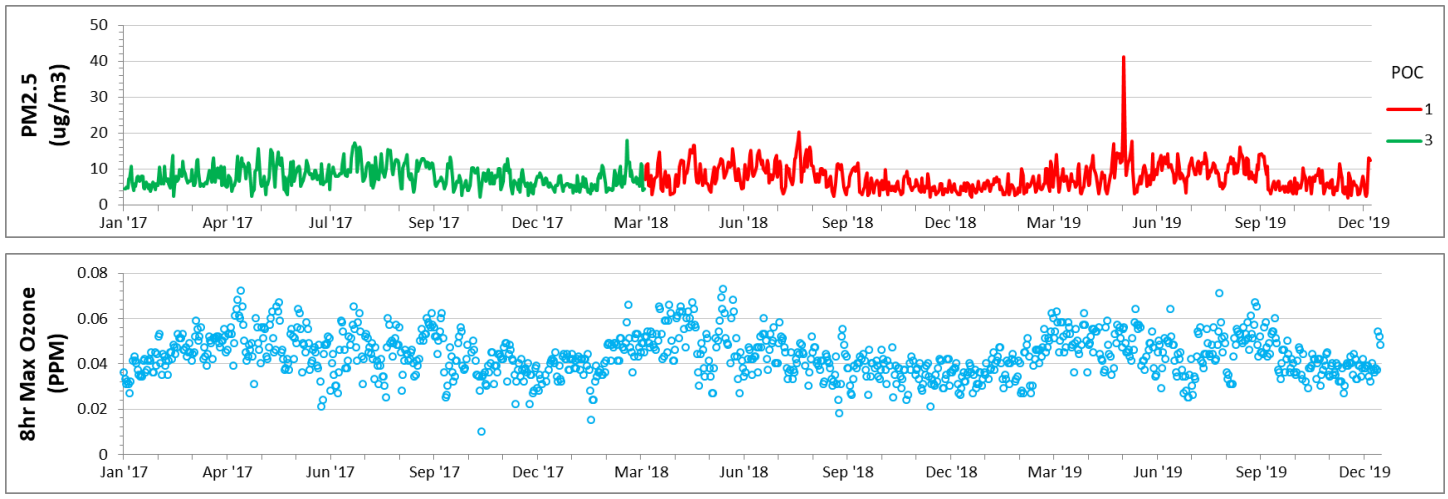


Look Rock – Blount County (GSM NP)

Address	Great Smoky Mountains NP Look Rock	
AQSID	47-009-0101	
CBSA	28940	
Lat, Lon	35.6334799, -83.941605999999993	
Parameter Code	44201	88502
Parameter Name	O_3	$PM_{2.5}$ Continuous
Monitor Type	SLAMS	SPM
POC	1	1
Int	W	1
Collection Frequency	Hourly	Hourly
Method	053	716
FRM/FEM Instrument	Monitor Labs 8810	None
Analysis	Ultraviolet	TEOM Gravimetric 50 deg C
Ref Mtd ID	EQOA-0881-053	None
Monitor Objective	General Background	
Dominant Source	0	
Measurement Scale	0	
Land Use Type	Forest	
Location Setting	Rural	

The Look Rock site is in Blount County, Tennessee and currently supports ambient air monitoring for ozone and other pollutants. The Look Rock site was initially established in 1980 and is located within the Tennessee portion of the Great Smoky Mountains National Park. This site is within and southeast of the Knoxville MSA. Ozone monitoring began on July 23, 1998 and $PM_{2.5}$ monitoring began on May 1, 2002. The Look Rock site is used with the PM Fine AQI forecasting program for verification and to help address fine particulate levels found in the GSMNP area. This site is operated and maintained by the NPS. The NPS is responsible for verifying, validating, and certifying the ozone data collected.

Look Rock Daily Air Quality

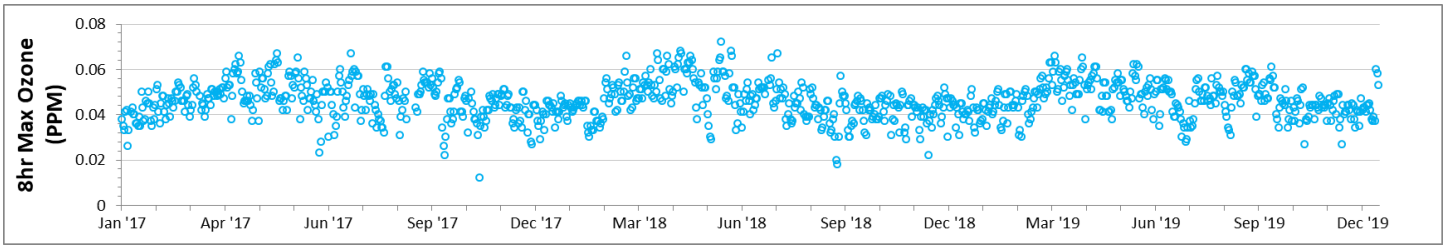


Cove Mountain – Sevier Country (GSM NP)

Address	Great Smoky Mountain NP- Cove Mountain
AQSID	47-155-0101
CBSA	42940
Lat, Lon	35.6966669999999, -83.609722
Parameter Code	44201
Parameter Name	O_3
Monitor Type	NON-EPA FEDERAL
POC	1
Int	W
Collection Frequency	Hourly
Method	47
FRM/FEM Instrument	Thermo Electron 49
Analysis	Ultraviolet
Ref Mtd ID	EQOA-0880-047
Monitor Objective	General/Background
Dominant Source	Area
Measurement Scale	Neighborhood
Land Use Type	Forest
Location Setting	Rural

The Cove Mt. site is in Sevier County, Tennessee and currently supports ambient air monitoring for ozone and meteorological parameters. It is located within the Tennessee portion of the Great Smoky Mountains National Park. This site is outside and southeast of the Knoxville MSA. Ozone monitoring began at Cove Mountain site on July 1, 1988. This site is used with the ozone AQI forecasting program for verification and to help address ozone levels found in the GSMNP area. This site is operated and maintained by the NPS. The NPS is responsible for verifying, validating, and certifying the ozone data collected.

Cove Mountain Daily Air Quality

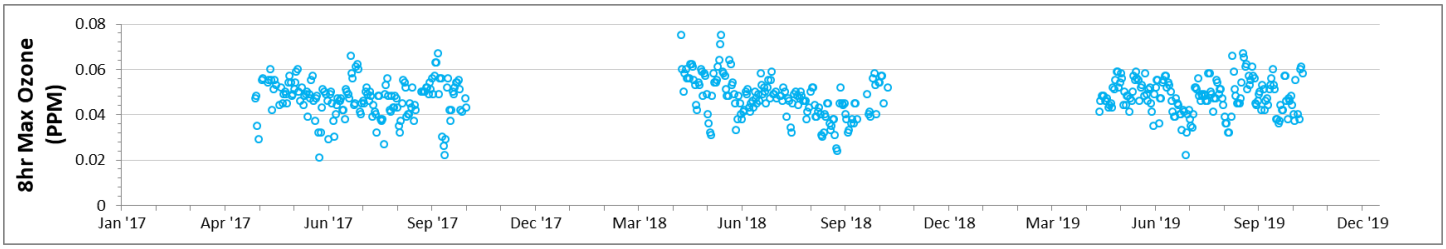


Clingman's Dome – Sevier County (GSM NP)

Address	Great Smoky Mountain Np Clingman's Dome
AQSID	47-155-0102
CBSA	42940
Lat, Lon	35.562778, -83.4981
Parameter Code	44201
Parameter Name	O_3
Monitor Type	NON-EPA FEDERAL
POC	1
Int	W
Year	2014
Collection Frequency	Hourly
Method	47
FRM/FEM Instrument	Thermo Electron 49
Analysis	Ultraviolet
Ref Mtd ID	EQOA-0880-47
Monitor Objective	Highest Concentration
Dominant Source	Area
Measurement Scale	Regional Scale
Land Use Type	Forest
Location Setting	Rural

The Clingman's Dome site is in Sevier County, Tennessee and currently supports ambient air monitoring for ozone and meteorological parameters. This site is located within the Tennessee portion of the Great Smoky Mountains National Park. This site is outside and southeast of the Knoxville MSA. The Clingman's Dome site began Ozone monitoring on April 1, 1993. This site is used with the ozone AQI forecasting program for verification and to help address ozone levels found in the GSMNP area. This site is located at the highest point inside of Tennessee and is on the border of Tennessee and North Carolina. The elevation of the site poses challenges in maintenance and access as the site is often impacted in the late fall and through-out the winter and spring by excessive snow fall and icing events that prevent access to the site. The ozone data collection season at this site is truncated due to the site access issues in March and April and in some years in October due to early snowfall events. This site is operated and maintained by the NPS. The NPS is responsible for verifying, validating, and certifying the ozone data collected.

Clingman's Dome Daily Air Quality



Tennessee Geographic Regions, Descriptions and Climate

Topographic Features - The topography of Tennessee is quite varied, stretching from the lowlands of the Mississippi Valley to the mountain peaks in the east. The westernmost part of the state, between the bluffs overlooking the Mississippi River and western valley of the Tennessee River, is a region of gently rolling plains sloping gradually from 200 to 250 feet in the west to about 600 feet above sea level in the hills overlooking the Tennessee River. The hilly Highland Rim, in a wide circle touching the Tennessee River Valley in the west and the Cumberland Plateau in the east, together with the enclosed Central Basin make up the whole of Middle Tennessee. The Highland Rim ranges from about 600 feet in elevation along the Tennessee River to 1,000 feet in the east and rises 300 to 400 feet above the Central Basin which is a rolling plain of about 600 feet average elevation, but with a crescent of hills reaching to over 1,000 feet south of Nashville. The Cumberland Plateau, with an average elevation of 2,000 feet extends roughly northeast-southwest across the state in a belt 30 to 50 miles wide, being bounded on the west by the Highland Rim and overlooking the Great Valley of East Tennessee on the east. The Great Valley, paralleling the Plateau to the west and the Great Smoky Mountains to the east, is a funnel shaped valley varying in width from about 30 miles in the south to about 90 miles in the north. Within the valley, which slopes from 1,500 feet in the north to 700 feet in the south, is a series of northeast-southwest ridges. Along the Tennessee-North Carolina border lie the Great Smoky Mountains, the most rugged and elevated portion of Tennessee, with numerous peaks from 4,000 to 6,000 feet.

Tennessee, except for a small area east of Chattanooga, lies entirely within the drainage of the Mississippi River system. The extreme western section of the state is drained through several relatively small rivers directly into the Mississippi River. Otherwise, drainage is into either the Cumberland or Tennessee Rivers, both of which flow northward near the end of their courses to join the Ohio River along the Kentucky-Illinois border. The Cumberland River, which drains north-central portions of Tennessee rises in the Cumberland Mountains in Kentucky, flows southwestward, then south into Tennessee reaching the Nashville area before tuning northward to re-enter Kentucky. The Tennessee River is formed by the juncture of the Holston and French Broad rivers at Knoxville. It flows southwesterly along the Alabama-Mississippi line, and then flows northward across the state into Kentucky. Besides the headwater streams, other important tributaries include the: Clinch, Little Tennessee, Hiawassee, Elk and Duck Rivers.

Temperature - Most aspects of the state's climate are related to the widely varying topography within its borders. The decrease of temperature with elevation is quite apparent, amounting to, on the average, three degrees Fahrenheit (°F) per 1,000 feet increase in elevation. Thus, higher portions of the state, such as the Cumberland Plateau and the mountains of the east, have lower average temperature than the Great Valley of East Tennessee, which they flank, and other lower parts of the state. In the Great Valley temperature increases from north to south, reaching a value at the south end comparable to that of Middle and West Tennessee where elevation variations are a generally minor consideration. Across the state, the average annual temperature varies from over 62° F in the extreme southwest to near 45 degrees atop the highest peaks of the east. It is of interest to note that average January temperature atop a 6,000-foot peak in the Great Smoky Mountains is equivalent to that in Central Ohio, while average July temperature is duplicated along the southern edge of the Hudson Bay in Canada. While most of the state can be described as having warm, humid summers and mild winters, this must be qualified to include variations with elevation. Thus, with increasing elevation, summers become cooler and more pleasant while winters become colder with increasing winds and dangerous snowfall events.

This dependence of temperature on elevation is of considerable importance to a variety of interests. Temperature, together with precipitation, plays an important role in determination what plant and animal life are adaptable to the area. In the Great Smoky Mountains, for example, the variations in elevation from 1,000 to 6,000 feet with attendant variations in temperature contribute to a remarkable variety of plant life. The relative coolness of the mountains also contributes to the popularity of that area during the warmer part of the year.

Length of growing season is linked to topography in a way like temperature, varying from an average of 237 days at low-lying Memphis to a near 130 days on the highest mountains in the east. Most of the state is included in the range of 180 to 220 days. Shorter growing seasons than this are confined to the mountains forming the state's eastern border and to the northern part of the Cumberland Plateau. Longer growing seasons are found in counties bordering the Mississippi River, parts of the Central Basin of the Middle Tennessee, and the southern end of the Great Valley of East Tennessee.

Precipitation - Since the principal source of moist air for this area is the Gulf of Mexico, there exists a gradual decrease of average precipitation from south to north. This effect is largely obscured however, by the overruling influence of topography. Air forced to ascend, cools and condenses out a portion of its moisture. Thus, average precipitation ranges from 46 to 54 inches, increasing from Mississippi bottomlands to the slight hills farther east. In Middle Tennessee the variation is from a minimum of 45 inches in the Central Basin to 50 to 55 inches in the surrounding hilly Highland Rim. Over the elevated Cumberland Plateau average annual precipitation is generally from 50 to 55 inches. In contrast, average annual precipitation in the Great Valley of East Tennessee increases from near 40 inches in northern portions to over 50 inches in the south. The northern minimum, lowest for the entire state, results from the shielding influence of the Great Smoky Mountains to the southeast and the Cumberland Plateau to the northwest. The mountainous eastern border of the state is the wettest, having average annual precipitation ranging up to 80 inches on the higher, and well-exposed peaks of the Great Smoky Mountains.

Over most of the state, the greatest precipitation occurs during the winter and early spring due to the more frequent passage of large-scale storms over and near the state during those months. A secondary maximum of precipitation occurs in midsummer in response to thunderstorm activity. This is especially pronounced in the mountains of the east where July rainfall exceeds the precipitation of any other month. Lightest precipitation, observed in the fall, is brought about by the maximum occurrence of slow moving, rain suppressing high pressure areas. Although all parts of Tennessee are generally well supplied with precipitation, there occurs on the average one or more prolonged dry spells each year during summer and fall. Studies illustrate the beneficial effects of supplemental irrigation of crops, despite usually bountiful annual precipitation.

Average annual snowfall varies from four to six inches in the southern and western parts of the state and in most of the Great Valley of East Tennessee to more than 10 inches over the northern Cumberland Plateau and the mountains of the east. Over most of the state, due to relatively mild winter temperatures, snow cover rarely persists for more than a few days.

The most important flood season is during the winter and early spring when the frequent migratory storms bring general rains of high intensity. During this period both widespread flooding and local flash floods can occur. During the summer, heavy thunderstorm rainfalls frequently result in local flash flooding. In the fall, while flood producing rains are rare, a decadent tropical system on occasion causes serious floods. The numerous dams constructed along the Tennessee and Cumberland rivers are major features in the control of flood waters in the state.

The dams of the Tennessee and Cumberland River systems and the lakes so formed, in addition to vastly reducing flood damage have facilitated water transportation, provided abundant low-cost hydroelectric power and created extensive recreation areas. Fishing, boating, swimming and camping along the many lakes, together with the several state and national parks, have made tourism one of the major industries in the state.

Climate and the Economy - Water resources of Tennessee have been a major factor in the state's industrial growth. The bountiful and good quality water supply has influenced the location of industry, especially chemical processing plants. Three major waterways, the Mississippi, Cumberland and Tennessee Rivers, are suitable for commercial traffic. Finally, the availability of low-cost hydroelectric power from the multipurpose dams of the

Cumberland and Tennessee rivers and tributaries has been stimulus to industry of all types. The principal types of manufacturing products are textile mill products, primary metals, fabricated metals and lumber products.

Although surpassed in monetary value by industrial activity, agriculture remains a vital feature of Tennessee's economic life. The wide range of climates in Tennessee, from river bottom to mountaintop, coupled with a wide range of soils, has resulted in many crops which thrive in the state.

Forests represent an additional important segment of Tennessee's natural resources related to the climate of the state. Timberland, containing principally hardwood types, covers approximately one-half of the total area of Tennessee. This has led to a highly diversified woodworking industry and made the area around Memphis the center of production for wood flooring. The temperate climate of the state is very favorable for logging operations, allowing full-scale activity during nine months of the year and to a lesser extent during the winter months.

Climate descriptions of Tennessee - Generally, Tennessee has a temperate climate, with warm summers and mild winters. However, the state's varied topography leads to a wide range of climatic conditions.

The warmest parts of the state, with the longest growing season, are the Gulf Coastal Plain, the Central Basin, and the Sequatchie Valley. In the Memphis area in the southwest, the average date of the last killing frost is 20 March, and the growing season is about 235 days. Memphis has an annual mean temperature of 62°F (17°C), 40°F (4°C) in January, and 83°F (28°C) in July. In the Nashville area, the growing season lasts about 225 days. Nashville has an annual mean of 59°F (15°C), ranging from 36°F (2°C) in January to 79°F (26°C) in July. The Knoxville area has a growing season of 220 days. The city's annual mean temperature is 60°F (16°C), with averages of 41°F (5°C) in January and 78°F (26°C) in July. In some parts of the mountainous east, where the temperatures are considerably lower, the growing season is as short as 130 days. The record high temperature for the state is 113°F (45°C), set at Perryville on 9 August 1930; the record low, –32°F (–36°C), was registered at Mountain City on 30 December 1917.

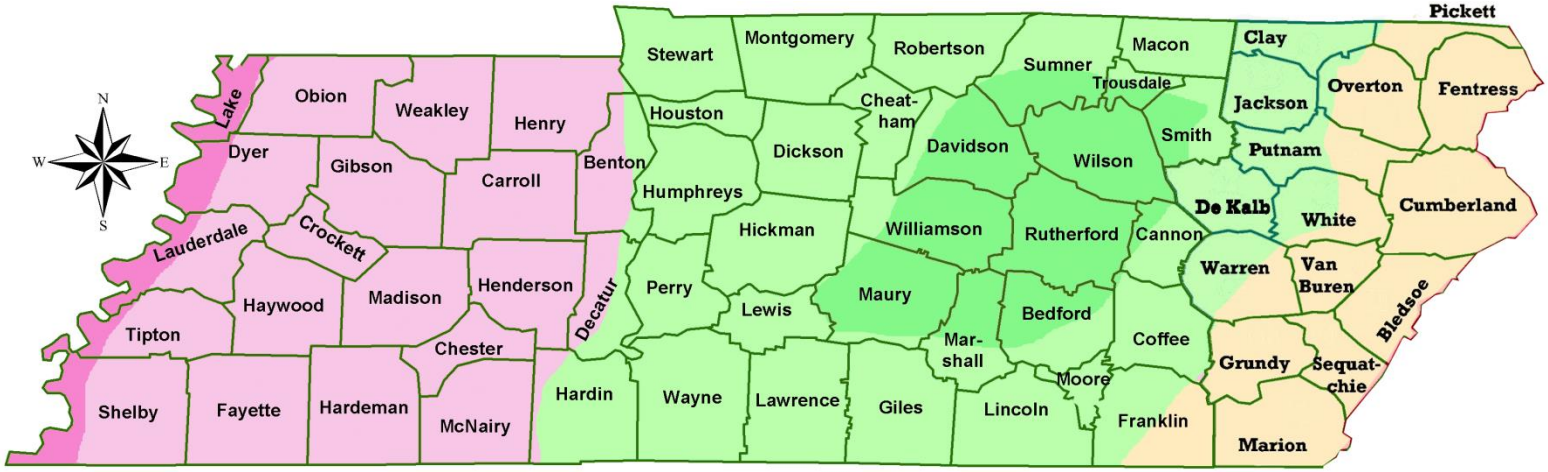
Severe storms occur infrequently. The greatest rainfall occurs in the winter and early spring, especially March; the early fall months, particularly September and October, are the driest. Average annual precipitation (1971–2000) was 54.7 in (138.9 cm) in Memphis and 48 in (122 cm) in Nashville. Snowfall varies and is more prevalent in East Tennessee than in the western section; Nashville gets about 10 in (25.4 cm) a year, Memphis only 5 in (12.7 cm).

Source:

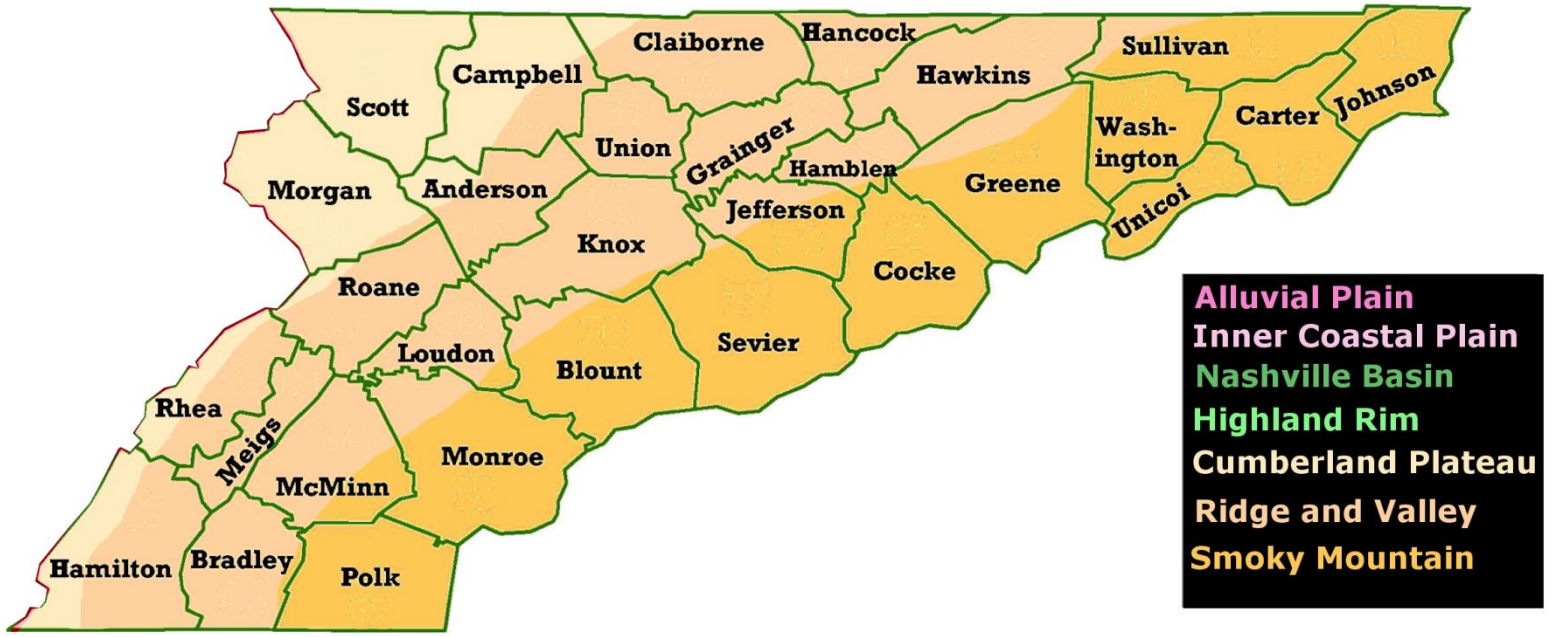
UT Institute of Agriculture > Tennessee Climatological Service > Climate Data for Tennessee

Map of Tennessee Geographic Regions

Central Time Zone Regions (CST UTC-6:00, CDT UTC-5:00)



Eastern Time Zone Regions (CST UTC-5:00, CDT UTC-4:00)



Climate Synopsis for Tennessee

The highly varied topography of Tennessee has a significant impact on the state's climate. The landscape varies generally from west to east, starting with the gently rolling lowlands (200-600' above sea level) in the west, rising to the Highland Rim (600-1000') enclosing the Central Basin, and on up to the Cumberland Plateau (~2000') which trends northeast-southwest across the state in a belt 30-50 miles wide. East of the Plateau is the Great Valley of East Tennessee (elevations ranging from 1500' in the north down to 700' in the south) containing a series of northeast-southwest ridges. The eastern border of the state is dominated by the Great Smoky Mountains, with numerous peaks rising 4000' to 6000' above sea level.

Average annual temperatures across the state range from around 57°F to 60°F (1981-2010). Winter mean temperatures are near 39°F (1981-2010) over most of the state, while summer temperatures average between 74°F and 78°F (1981-2010). Of course, these general patterns are affected by topography: the higher mountain areas tend to have milder summers as well as colder, more blustery winters. The length of the growing season is also linked to topography: most of the state has a growing season between 180 and 220 days, but this stretches to over 235 days in the lowlands around Memphis and drops to near 130 days in the highest mountains to the east.

The principal source of moisture for the state is the Gulf of Mexico to the south, which results in a gradual decrease of precipitation from south to north. This gradient is largely obscured, however, by orographic effects. In West Tennessee, annual precipitation amounts range from 46 inches to 54 inches, increasing from the Mississippi bottomlands to the slight hills farther east. In Middle Tennessee, the variation is from around 45 inches in the Central Basin to 50-55 inches in the surrounding Highland Rim. The Cumberland Plateau also averages 50-55 inches per year. In the Great Valley of Eastern Tennessee, annual precipitation rises from a minimum of 40 inches in the north (the driest part of the state due to the rain shadow effect of the Great Smoky Mountains and the Cumberland Plateau) to over 50 inches in the south. The mountainous eastern border of the state is the wettest part, with annual totals of up to 80 inches in the higher, well-exposed peaks.

Over most of the state, the greatest precipitation occurs in winter and early spring owing to the more frequent passage of large-scale (frontal) storms over the region. A secondary maximum of precipitation occurs in midsummer in response to shower and thunderstorm activity, especially in July in the mountains of the east. Fall tends to be the dry season for the state, due to the higher frequency of slow-moving high-pressure areas during this season. Average annual snowfall ranges from 4-6 inches in the south and west to over 10 inches in the east. Due to the relatively mild winter conditions over most of the state, snow cover rarely persists for more than a few days.

Severe storms are relatively infrequent in the state, being east of the center of tornado activity, south of most blizzard conditions, and too far inland to be often affected by hurricanes. Averages of 26 (1991-2011) tornadoes are observed in the state each year, mostly confined to areas west of the Cumberland Plateau. Hailstorms (>1”) at a given location are observed 3 to 6 (2003-2012) times a year, and damaging glaze storms occur in the state every 3 or 4 years (1996-2013). Thunderstorms are frequent in the warm season, and severe thunderstorms with damaging winds are experienced at scattered locations throughout the state each year.

Adapted from: Climatography of the United States, No. 60, National Climatic Data Center

Updated 2/26/2014 by TDAPC using data from NCDC

3-Yr (2017-2019) Wind Rose Data for 10 TN Area ASOS Stations

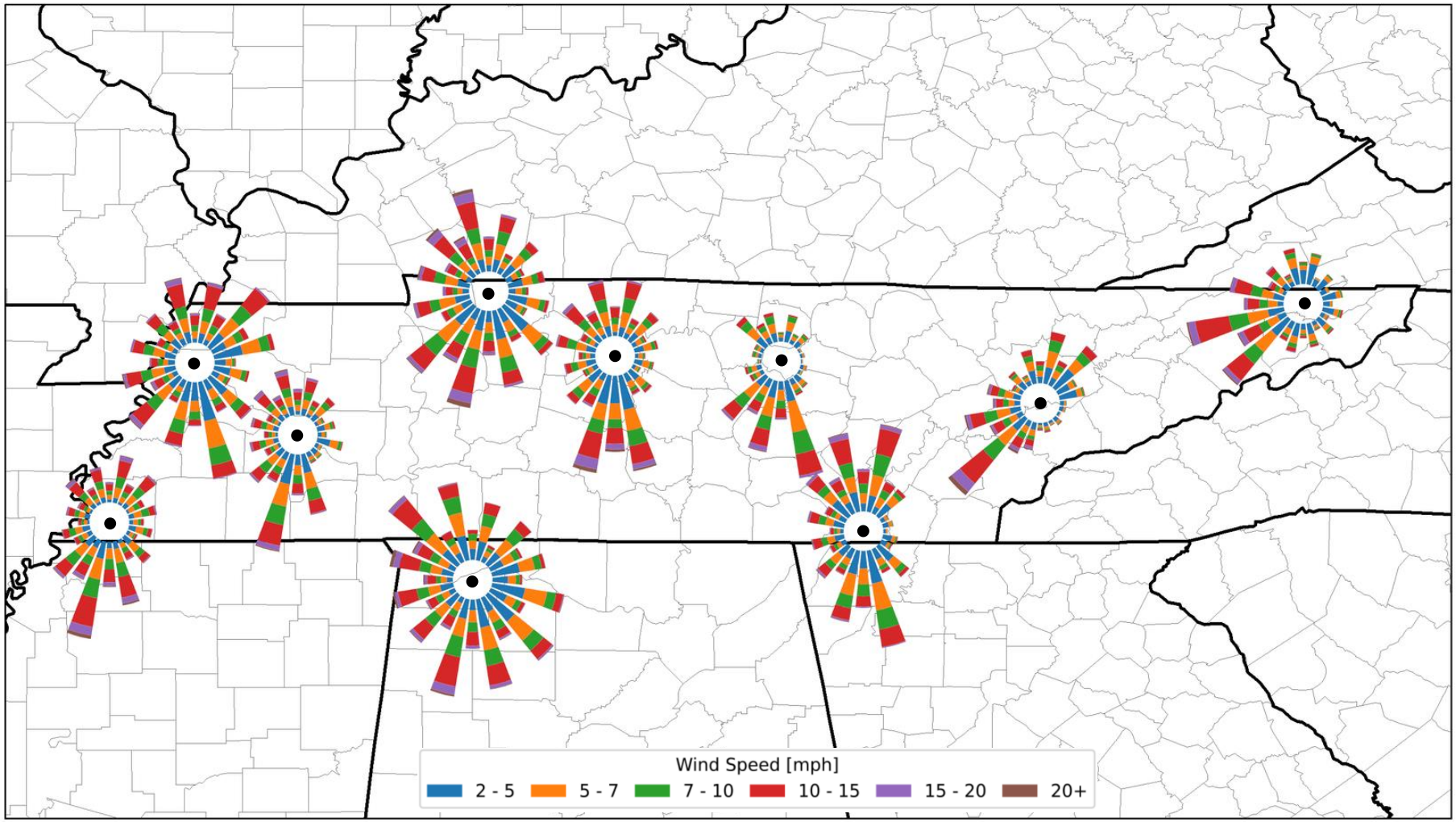


Table 2: Tennessee Metropolitan Statistical Areas and Population Estimates

CBSA	STCOU	NAME	LSAD	CENSUS 2010 POP	POP EST 2019
16860		**Chattanooga, TN-GA**	**Metropolitan Statistical Area**	**528143**	**565194**
16860	13047	Catoosa County, GA	County or equivalent	63942	67580
16860	13083	Dade County, GA	County or equivalent	16633	16116
16860	13295	Walker County, GA	County or equivalent	68756	69761
16860	47065	Hamilton County, TN	County or equivalent	336463	367804
16860	47115	Marion County, TN	County or equivalent	28237	28907
16860	47153	Sequatchie County, TN	County or equivalent	14112	15026
17300		**Clarksville, TN-KY**	**Metropolitan Statistical Area**	**273949**	**307820**
17300	21047	Christian County, KY	County or equivalent	73955	70461
17300	21221	Trigg County, KY	County or equivalent	14339	14651
17300	47125	Montgomery County, TN	County or equivalent	172331	208993
17300	47161	Stewart County, TN	County or equivalent	13324	13715
17420		**Cleveland, TN**	**Metropolitan Statistical Area**	**115788**	**124942**
17420	47011	Bradley County, TN	County or equivalent	98963	108110
17420	47139	Polk County, TN	County or equivalent	16825	16832
27180		**Jackson, TN**	**Metropolitan Statistical Area**	**179694**	**178644**
27180	47023	Chester County, TN	County or equivalent	17131	17297
27180	47033	Crockett County, TN	County or equivalent	14586	14230
27180	47053	Gibson County, TN	County or equivalent	49683	49133
27180	47113	Madison County, TN	County or equivalent	98294	97984
27740		**Johnson City, TN**	**Metropolitan Statistical Area**	**198716**	**202719**
27740	47019	Carter County, TN	County or equivalent	57424	56351
27740	47171	Unicoi County, TN	County or equivalent	18313	17761
27740	47179	Washington County, TN	County or equivalent	122979	128607
28700		**Kingsport-Bristol-Bristol, TN-VA**	**Metropolitan Statistical Area**	**309544**	**307202**
28700	47073	Hawkins County, TN	County or equivalent	56833	56786
28700	47163	Sullivan County, TN	County or equivalent	156823	158348
28700	51169	Scott County, VA	County or equivalent	23177	21566
28700	51191	Washington County, VA	County or equivalent	54876	53740
28700	51520	Bristol city, VA	County or equivalent	17835	16762
28940		**Knoxville, TN**	**Metropolitan Statistical Area**	**814914**	**869046**
28940	47001	Anderson County, TN	County or equivalent	75129	76978
28940	47009	Blount County, TN	County or equivalent	123010	133088
28940	47013	Campbell County, TN	County or equivalent	40716	39842
28940	47093	Knox County, TN	County or equivalent	432226	54068
28940	47105	Loudon County, TN	County or equivalent	48556	21403
28940	47129	Morgan County, TN	County or equivalent	21987	53382
28940	47145	Roane County, TN	County or equivalent	54181	19972
28940	47173	Union County, TN	County or equivalent	19109	76978
32820		**Memphis, TN-MS-AR**	**Metropolitan Statistical Area**	**1316100**	**1346045**

CBSA	STCOU	NAME	LSAD	CENSUS 2010 POP	POP EST 2019
32820	5035	Crittenden County, AR	County or equivalent	50902	47955
32820	28033	DeSoto County, MS	County or equivalent	161252	35294
32820	28093	Marshall County, MS	County or equivalent	37144	28321
32820	28137	Tate County, MS	County or equivalent	28886	9632
32820	28143	Tunica County, MS	County or equivalent	10778	41133
32820	47047	Fayette County, TN	County or equivalent	38413	937166
32820	47157	Shelby County, TN	County or equivalent	927644	61599
32820	47167	Tipton County, TN	County or equivalent	61081	47955
34100		**Morristown, TN**	**Metropolitan Statistical Area**	**136608**	**142749**
28940	47057	Grainger County, TN	County or equivalent	22657	23320
34100	47063	Hamblen County, TN	County or equivalent	62544	64934
34100	47089	Jefferson County, TN	County or equivalent	51407	54495
34980		**Nashville-Davidson--Murfreesboro--Franklin, TN**	**Metropolitan Statistical Area**	**1646200**	**1934317**
34980	47015	Cannon County, TN	County or equivalent	13801	14678
34980	47021	Cheatham County, TN	County or equivalent	39105	40667
34980	47037	Davidson County, TN	County or equivalent	626681	694144
34980	47043	Dickson County, TN	County or equivalent	49666	53948
34980	47111	Macon County, TN	County or equivalent	22248	96387
34980	47119	Maury County, TN	County or equivalent	80956	71813
34980	47147	Robertson County, TN	County or equivalent	66283	332285
34980	47149	Rutherford County, TN	County or equivalent	262604	20157
34980	47159	Smith County, TN	County or equivalent	19166	191283
34980	47165	Sumner County, TN	County or equivalent	160645	11284
34980	47169	Trousdale County, TN	County or equivalent	7870	238412
34980	47187	Williamson County, TN	County or equivalent	183182	144657
34980	47189	Wilson County, TN	County or equivalent	113993	14678

Table 3: Tennessee Micropolitan Statistical Areas and Population Estimates

CBSA	STCOU	NAME	LSAD	CENSUS 2010 POP	POP EST 2019
11940		**Athens, TN**	**Micropolitan Statistical Area**	**52266**	**53794**
11940	47107	McMinn County, TN	County or equivalent	52266	53,794
18260		**Cookeville, TN**	**Micropolitan Statistical Area**	**106042**	**114272**
18260	47087	Jackson County, TN	County or equivalent	11638	11,786
18260	47133	Overton County, TN	County or equivalent	22083	22,241
18260	47141	Putnam County, TN	County or equivalent	72321	80,245
18900		**Crossville, TN**	**Micropolitan Statistical Area**	**56053**	**60520**
18900	47035	Cumberland County, TN	County or equivalent	56053	60,520
19420		**Dayton, TN**	**Micropolitan Statistical Area**	**31809**	**33167**
19420	47143	Rhea County, TN	County or equivalent	31809	33,167
20540		**Dyersburg, TN**	**Micropolitan Statistical Area**	**38335**	**37159**
20540	47045	Dyer County, TN	County or equivalent	38335	37,159
24620		**Greeneville, TN**	**Micropolitan Statistical Area**	**68831**	**69069**
24620	47059	Greene County, TN	County or equivalent	68831	69,069
29980		**Lawrenceburg, TN**	**Micropolitan Statistical Area**	**41869**	**44142**
29980	47099	Lawrence County, TN	County or equivalent	41869	44,142
30280		**Lewisburg, TN**	**Micropolitan Statistical Area**	**30617**	**34375**
30280	47117	Marshall County, TN	County or equivalent	30617	34,375
32280		**Martin, TN**	**Micropolitan Statistical Area**	**35021**	**33328**
32280	47183	Weakley County, TN	County or equivalent	35021	33,328
32660		**McMinnville, TN**	**Micropolitan Statistical Area**	**39839**	**41277**
32660	47177	Warren County, TN	County or equivalent	39839	41,277
35460		**Newport, TN**	**Micropolitan Statistical Area**	**35662**	**36004**
35460	47029	Cocke County, TN	County or equivalent	35662	36,004
37540		**Paris, TN**	**Micropolitan Statistical Area**	**32330**	**32345**
37540	47079	Henry County, TN	County or equivalent	32330	32,345
42940		**Sevierville, TN**	**Micropolitan Statistical Area**	**89889**	**98250**
42940	47155	Sevier County, TN	County or equivalent	89889	98,250
43180		**Shelbyville, TN**	**Micropolitan Statistical Area**	**45058**	**49713**
43180	47003	Bedford County, TN	County or equivalent	45058	49,713
46100		**Tullahoma-Manchester, TN**	**Micropolitan Statistical Area**	**100210**	**105216**
46100	47031	Coffee County, TN	County or equivalent	52796	56,520
46100	47051	Franklin County, TN	County or equivalent	41052	42,208

46100	47127	Moore County, TN	County or equivalent	6362	6,488
46460		**Union City, TN-KY**	**Micropolitan Statistical Area**	**31807**	**30069**
46460	47131	Obion County, TN	County or equivalent	31807	30,069

https://www.census.gov/data/datasets/time-series/demo/popest/2010s-state-total.html#par_textimage_1873399417

Table 4: Tennessee County Population Data Trends

(2010 Census and Estimates to 2019 by US Census Bureau)

Annual Estimates of the Resident Population for Counties in Tennessee: April 1, 2010 to July 1, 2019												
Geographic Area	April 1, 2010		Population Estimate (as of July 1, 2019)									
	Census	Estimates Base	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Tennessee	**6,346,105**	**6,346,276**	**6,355,311**	**6,399,291**	**6,453,898**	**6,494,340**	**6,541,223**	**6,591,170**	**6,646,010**	**6,708,799**	**6,771,631**	**6,829,174**
Anderson	75,129	75,082	75,098	75,209	75,225	75,299	75,157	75,456	75,528	76,056	76,287	76,978
Bedford	45,058	45,057	45,078	45,247	45,254	45,565	46,251	46,948	47,442	48,211	49,146	49,713
Benton	16,489	16,491	16,511	16,529	16,445	16,360	16,197	16,220	16,082	15,993	16,246	16,160
Bledsoe	12,876	12,874	12,884	12,992	12,926	13,910	14,501	14,601	14,738	14,895	14,883	15,064
Blount	123,010	123,098	123,199	123,664	124,024	124,874	125,847	126,954	128,264	129,999	131,331	133,088
Bradley	98,963	98,926	99,083	99,798	101,049	101,778	102,771	103,774	104,390	105,421	107,050	108,110
Campbell	40,716	40,723	40,735	40,688	40,532	40,247	39,893	39,772	39,784	39,791	39,795	39,842
Cannon	13,801	13,813	13,797	13,724	13,789	13,700	13,572	13,740	13,876	14,157	14,440	14,678
Carroll	28,522	28,486	28,454	28,547	28,667	28,606	28,411	27,982	27,901	27,807	27,975	27,767
Carter	57,424	57,383	57,342	57,385	57,347	56,978	56,325	56,375	56,473	56,510	56,417	56,391
Cheatham	39,105	39,110	39,131	38,986	39,231	39,340	39,610	39,593	39,775	40,366	40,502	40,667
Chester	17,131	17,145	17,194	17,150	17,076	17,116	17,136	17,123	17,130	17,154	17,245	17,297
Claiborne	32,213	32,212	32,215	32,106	31,763	31,627	31,571	31,555	31,634	31,661	31,850	31,959
Clay	7,861	7,853	7,844	7,741	7,702	7,688	7,620	7,663	7,654	7,663	7,677	7,615
Cocke	35,662	35,642	35,640	35,432	35,530	35,400	35,266	35,138	35,234	35,528	35,858	36,004
Coffee	52,796	52,803	52,770	52,920	53,147	53,298	53,524	54,093	54,537	55,016	55,877	56,520
Crockett	14,586	14,576	14,588	14,560	14,610	14,610	14,652	14,586	14,448	14,436	14,296	14,230
Cumberland	56,053	56,060	56,193	56,527	56,990	57,438	57,924	58,217	58,580	59,023	59,738	60,520
Davidson	626,681	626,558	627,746	635,918	649,344	660,179	669,611	679,793	685,829	687,159	690,516	694,144
Decatur	11,757	11,750	11,717	11,682	11,634	11,696	11,685	11,600	11,735	11,732	11,699	11,663
DeKalb	18,723	18,722	18,695	18,754	18,869	19,150	19,227	19,292	19,444	19,876	20,133	20,490
Dickson	49,666	49,650	49,684	49,982	50,214	50,164	50,465	51,334	51,900	52,774	53,446	53,948
Dyer	38,335	38,330	38,318	38,118	38,188	38,093	37,807	37,753	37,542	37,339	37,286	37,159
Fayette	38,413	38,439	38,427	38,570	38,686	38,812	39,123	39,280	39,703	40,150	40,556	41,133
Fentress	17,959	17,962	17,923	17,997	17,916	17,904	17,849	17,965	18,040	18,214	18,322	18,523
Franklin	41,052	41,064	40,959	40,857	40,688	41,213	41,288	41,343	41,518	41,623	41,935	42,208
Gibson	49,683	49,687	49,731	49,898	49,666	49,380	49,436	49,329	49,250	49,255	49,171	49,133
Giles	29,485	29,476	29,406	29,284	28,969	28,801	28,819	28,973	29,165	29,379	29,446	29,464
Grainger	22,657	22,656	22,721	22,753	22,689	22,739	22,862	22,848	23,095	23,106	23,137	23,320
Greene	68,831	68,825	68,834	69,173	68,760	68,336	68,464	68,586	68,529	68,821	69,164	69,069
Grundy	13,703	13,726	13,725	13,588	13,583	13,449	13,340	13,337	13,276	13,332	13,348	13,427
Hamblen	62,544	62,534	62,510	62,899	62,764	63,051	63,010	63,353	63,681	64,062	64,629	64,934
Hamilton	336,463	336,477	337,214	341,094	345,693	349,050	350,729	353,690	357,778	361,032	364,293	367,804
Hancock	6,819	6,811	6,798	6,708	6,657	6,621	6,619	6,577	6,583	6,593	6,561	6,620
Hardeman	27,253	27,245	27,169	26,869	26,612	26,360	25,989	25,817	25,584	25,488	25,276	25,050
Hardin	26,026	26,008	26,050	25,869	25,962	25,925	25,801	25,754	25,740	25,738	25,693	25,652
Hawkins	56,833	56,826	56,870	56,621	56,560	56,696	56,481	56,370	56,565	56,620	56,713	56,786
Haywood	18,787	18,807	18,812	18,546	18,276	18,234	18,235	18,036	17,822	17,607	17,347	17,304
Henderson	27,769	27,780	27,788	28,039	28,082	28,042	28,093	28,078	27,855	27,851	27,983	28,117
Henry	32,330	32,349	32,398	32,440	32,377	32,250	32,245	32,127	32,232	32,380	32,336	32,345
Hickman	24,690	24,690	24,647	24,364	24,192	24,207	24,465	24,373	24,666	24,839	25,007	25,178
Houston	8,426	8,429	8,451	8,347	8,424	8,276	8,221	8,124	8,101	8,158	8,234	8,201
Humphreys	18,538	18,535	18,558	18,403	18,287	18,244	18,147	18,157	18,383	18,503	18,551	18,582
Jackson	11,638	11,634	11,625	11,558	11,595	11,561	11,524	11,534	11,611	11,702	11,777	11,786
Jefferson	51,407	51,668	51,714	51,908	52,300	52,134	52,408	53,011	53,148	53,730	54,012	54,495
Johnson	18,244	18,240	18,286	18,223	18,159	18,014	17,935	17,842	17,759	17,603	17,774	17,788
Knox	432,226	432,260	432,938	436,776	440,791	444,314	447,903	451,297	456,089	461,565	466,258	470,313
Lake	7,832	7,832	7,827	7,793	7,715	7,713	7,680	7,602	7,531	7,451	7,407	7,016

Annual Estimates of the Resident Population for Counties in Tennessee: April 1, 2010 to July 1, 2019												
Geographic Area	April 1, 2010		Population Estimate (as of July 1, 2019)									
	Census	Estimates Base	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Lauderdale	27,815	27,822	27,721	27,701	27,694	27,573	27,357	26,903	25,320	26,093	25,997	25,633
Lawrence	41,869	41,856	41,967	42,162	42,154	42,028	42,304	42,592	43,056	43,388	43,771	44,142
Lewis	12,161	12,170	12,173	12,146	11,942	11,994	11,886	11,875	11,891	12,025	12,074	12,268
Lincoln	33,361	33,354	33,382	33,387	33,379	33,499	33,443	33,609	33,564	33,892	34,189	34,366
Loudon	48,556	48,561	48,710	49,188	49,823	50,386	50,586	50,916	51,373	52,260	53,082	54,068
McMinn	52,266	52,287	52,176	52,335	52,441	52,431	52,675	52,502	52,700	52,931	53,336	53,794
McNairy	26,075	26,082	26,066	26,077	26,142	26,035	26,032	25,864	25,832	26,001	25,830	25,694
Macon	22,248	22,226	22,237	22,455	22,488	22,637	22,919	23,076	23,340	23,905	24,289	24,602
Madison	98,294	98,303	98,249	98,084	98,505	98,730	98,134	97,569	97,478	97,491	97,603	97,984
Marion	28,237	28,222	28,220	28,099	28,226	28,326	28,405	28,397	28,383	28,406	28,598	28,907
Marshall	30,617	30,611	30,687	30,848	30,971	31,140	31,287	31,590	32,035	33,020	33,806	34,375
Maury	80,956	80,932	81,172	81,528	82,054	83,618	85,384	87,425	89,556	92,237	94,273	96,387
Meigs	11,753	11,766	11,792	11,687	11,668	11,659	11,703	11,804	11,953	12,042	12,297	12,422
Monroe	44,519	44,498	44,610	44,903	45,095	45,228	45,391	45,625	45,848	46,035	46,269	46,545
Montgomery	172,331	172,362	173,159	176,504	184,782	184,252	189,005	192,398	194,424	199,771	205,312	208,993
Moore	6,362	6,342	6,330	6,367	6,289	6,274	6,285	6,261	6,293	6,391	6,457	6,488
Morgan	21,987	21,986	22,019	21,998	21,892	21,673	21,699	21,494	21,741	21,555	21,534	21,403
Obion	31,807	31,807	31,822	31,675	31,310	31,017	30,828	30,561	30,547	30,375	30,274	30,069
Overton	22,083	22,082	22,092	22,165	22,164	21,969	21,951	22,067	21,964	21,998	22,068	22,241
Perry	7,915	7,930	7,940	7,865	7,852	7,880	7,819	7,852	7,880	7,954	8,050	8,076
Pickett	5,077	5,086	5,082	5,124	5,048	5,013	5,078	5,139	5,091	5,062	5,053	5,048
Polk	16,825	16,821	16,813	16,771	16,624	16,632	16,684	16,769	16,794	16,759	16,918	16,832
Putnam	72,321	72,339	72,549	73,065	73,529	74,095	74,930	75,074	75,985	77,299	78,631	80,245
Rhea County	31,809	31,804	31,858	32,082	32,367	32,529	32,623	32,373	32,474	32,671	32,911	33,167
Roane	54,181	54,208	54,169	53,988	53,615	53,161	52,852	52,770	52,944	53,020	53,258	53,382
Robertson	66,283	66,319	66,322	66,775	66,798	67,412	68,046	68,687	69,393	70,328	71,179	71,813
Rutherford	262,604	262,588	263,708	269,160	274,397	281,148	288,848	298,197	307,415	316,531	324,647	332,285
Scott	22,228	22,232	22,227	22,105	22,175	22,062	21,990	21,893	21,890	21,964	22,028	22,068
Sequatchie	14,112	14,121	14,128	14,274	14,350	14,537	14,634	14,641	14,754	14,767	14,891	15,026
Sevier	89,889	89,720	89,923	91,192	92,362	93,477	94,660	95,417	96,470	97,307	97,895	98,250
Shelby	927,644	927,682	928,447	933,186	939,168	938,363	937,500	937,067	936,021	935,251	936,365	937,166
Smith	19,166	19,150	19,126	19,210	19,179	19,117	19,097	19,308	19,526	19,732	19,979	20,157
Stewart	13,324	13,313	13,348	13,223	13,309	13,277	13,210	13,187	13,190	13,422	13,619	13,715
Sullivan	156,823	156,800	156,749	156,876	156,322	156,185	156,404	156,199	156,182	156,924	157,599	158,348
Sumner	160,645	160,634	161,214	163,680	165,967	168,754	172,269	175,326	179,332	183,756	187,490	191,283
Tipton	61,081	61,006	61,065	61,305	61,524	61,572	61,596	61,533	61,223	61,305	61,576	61,599
Trousdale	7,870	7,864	7,874	7,815	7,794	7,810	7,998	8,051	9,955	10,831	11,033	11,284
Unicoi	18,313	18,311	18,284	18,302	18,253	18,095	17,951	17,819	17,737	17,796	17,822	17,883
Union	19,109	19,107	19,116	19,191	19,105	19,063	18,991	19,159	19,219	19,399	19,689	19,972
Van Buren	5,548	5,558	5,569	5,555	5,653	5,574	5,696	5,695	5,721	5,747	5,763	5,872
Warren	39,839	39,824	39,858	39,907	39,744	39,875	39,983	40,262	40,428	40,717	40,826	41,277
Washington	122,979	123,063	123,384	123,887	124,873	125,397	125,745	126,137	127,247	127,603	128,661	129,375
Wayne	17,021	17,025	16,985	17,000	16,973	16,920	16,860	16,767	16,747	16,641	16,635	16,673
Weakley	35,021	35,015	35,044	34,857	34,554	34,155	34,001	33,872	33,610	33,325	33,413	33,328
White	25,841	25,844	25,828	26,050	26,031	26,193	26,264	26,342	26,463	26,764	27,086	27,345
Williamson	183,182	183,277	184,143	188,501	193,211	199,143	205,334	211,605	218,903	226,048	231,978	238,412
Wilson	113,993	114,062	114,677	116,800	119,143	121,990	125,197	128,536	132,494	136,691	140,954	144,657

Note: The estimates are based on the 2010 Census and reflect changes to the April 1, 2010 population due to the Count Question Resolution program and geographic program revisions. All geographic boundaries for the 2019 population estimates are as of January 1, 2019. For

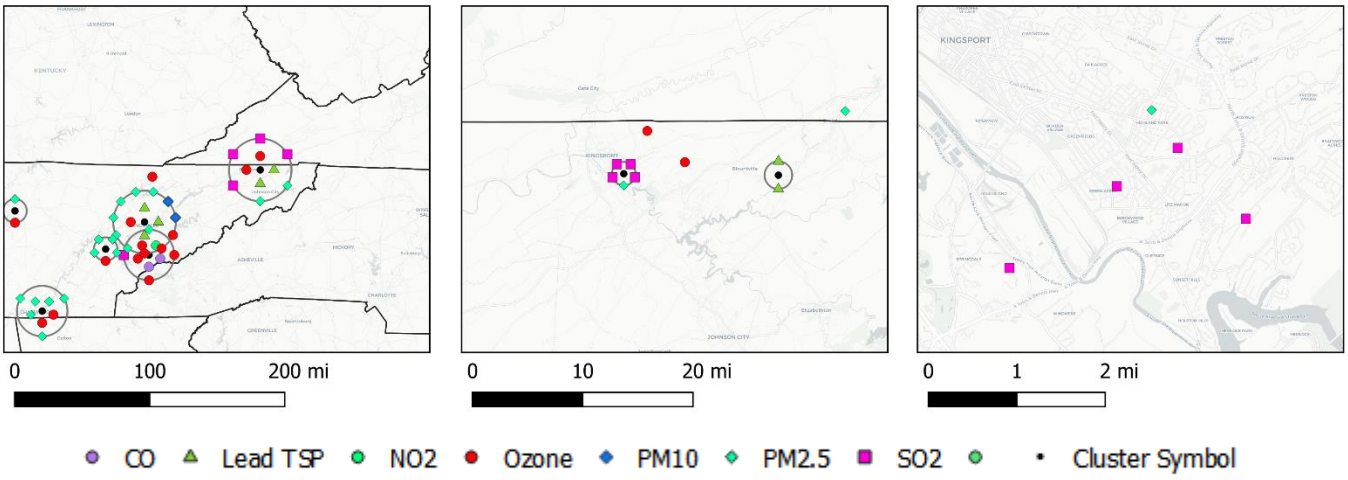
Suggested Citation:
Annual Estimates of the Resident Population for Counties in Tennessee: April 1, 2010 to July 1, 2019 (CO-EST2019-ANNRES-47)
Source: U.S. Census Bureau, Population Division
Release Date: March 2020

The following maps depict the most recent statistical area boundaries. The first map groups metropolitan and micropolitan areas by their combined statistical area (CSA) and shades the areas accordingly. Some notable updates to Tennessee's statistical areas include:

- The addition of Stewart County to the Clarksville CBSA
- The addition of Gibson County to the Jackson CBSA
- The removal of Grainger County from the Knoxville MSA and its addition to the Morristown CBSA
- The removal of Hickman County from the Nashville MSA

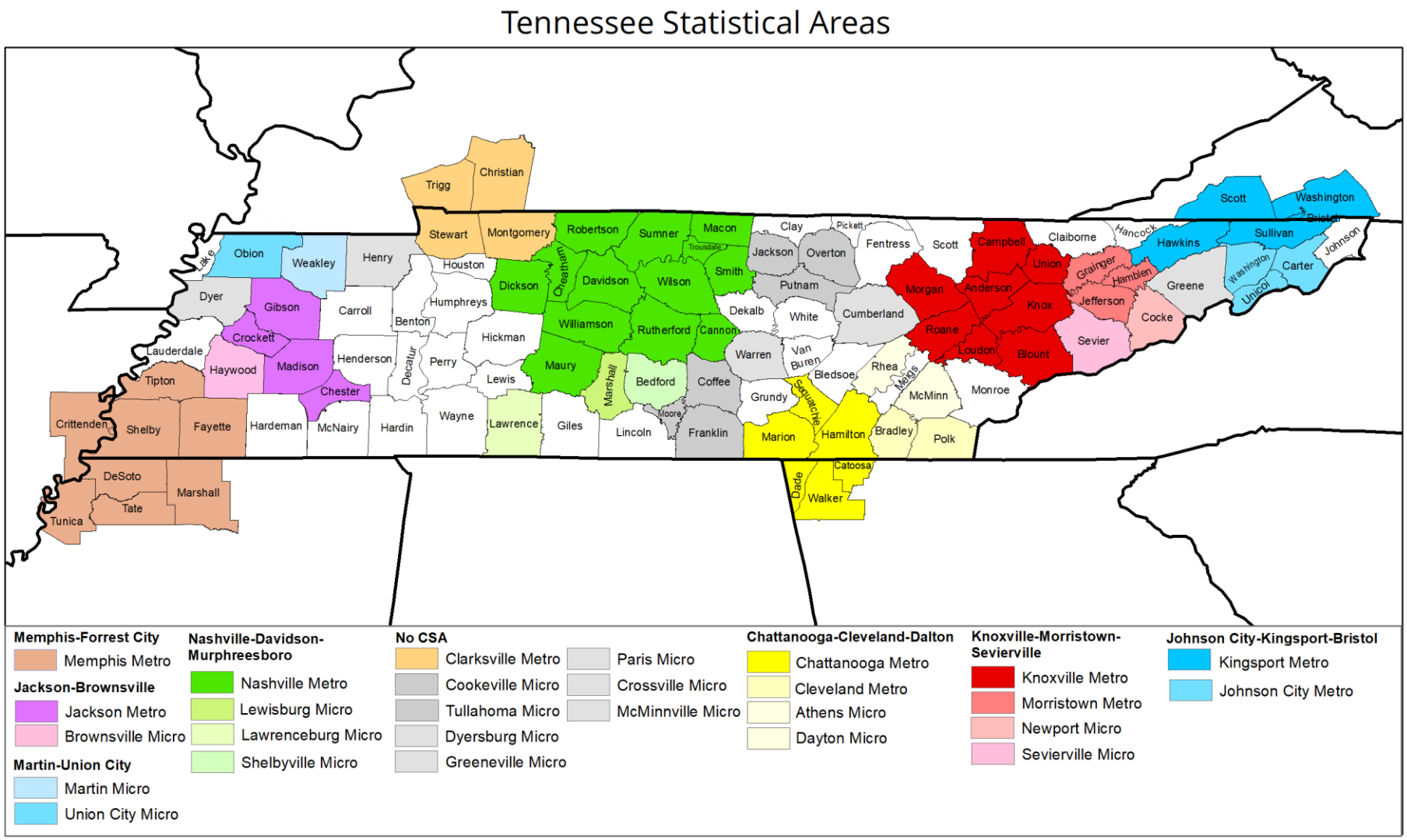
Although these changes did not affect any monitoring requirements, they did affect the overall population of their respective CBSAs.

The second map depicts the metropolitan area boundaries (dashed lines) and groups all the active air quality monitors together in clusters. Due to the difficulty in plotting sites with multiple pollutants and sites that are located in close proximity, the monitors are displayed using the cluster method, where all monitors in an area are grouped together and concentric rings plot the symbols of each monitor by the pollutant they measure around the group's centroid. The outer ring represents the area of monitors being grouped. The example below shows this concept at multiple scales.

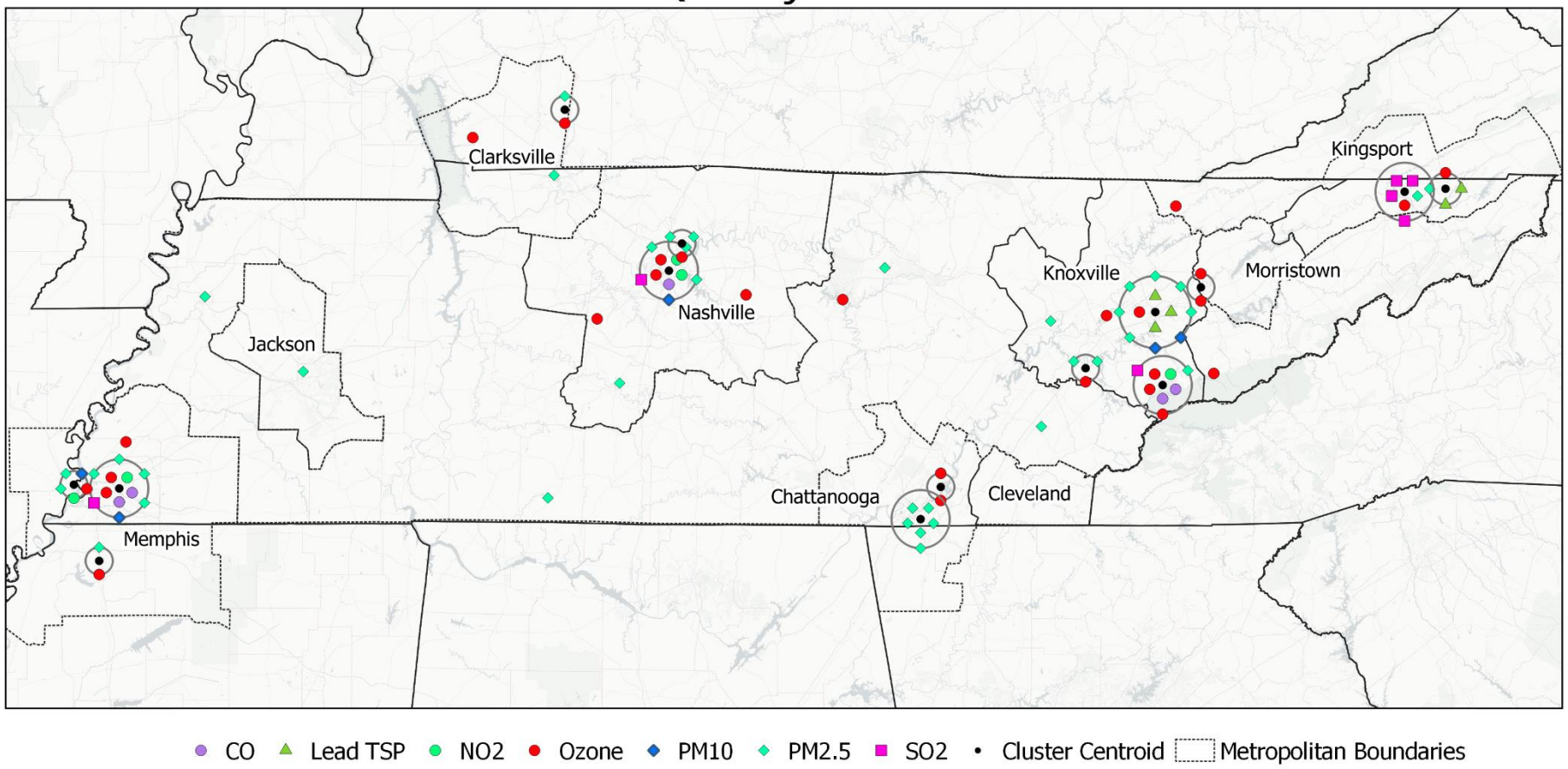


Combined/Metropolitan/Micropolitan Statistical Areas of Tennessee

September 2019



TN Area Air Quality Monitor Clusters



Appendix A DAPC Monitoring Equipment Evaluation 2020

Location	Item Description	Equipment Notes	Condition
Ross N Robinson	Data logger	8832	good
Nashville EFO	Data logger	8832	good
Nashville EFO	Data logger	8832	good
Nashville EFO	Data logger	8832	good
Nashville EFO	Data logger	8832	good
Nashville EFO	Data logger	8832	good
Nashville EFO	Data logger	8832	good
Nashville EFO	Data logger	8832	good
Nashville EFO	Data logger	8832	good
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Nashville EFO	Data logger	8832	good
Nashville EFO	Data logger	8832	good
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Nashville EFO	Data logger	8832	good
Nashville EFO	Data logger	8832	good
Nashville EFO	Data logger	8832	good
Nashville EFO	Data logger	8832	good
Nashville EFO	Data logger	8832	good
Nashville EFO	Data logger	8832	good
Nashville EFO	Data logger	8832	good
Skyland Drive	Data logger	8832	good
Athens	AirLink RV50	Remote Communication	good
Clarksville	AirLink RV50	Remote Communication	good
Loretto	AirLink RV50	Remote Communication	good
Harriman	AirLink RV50	Remote Communication	good
Freels Bend	AirLink RV50	Remote Communication	good
Loudon	AirLink RV50	Remote Communication	good
Kingsport Ozone	AirLink RV50	Remote Communication	good
Cookeville	AirLink RV50	Remote Communication	good
Columbia	AirLink RV50	Remote Communication	good
Kingsport PM25	AirLink RV50	Remote Communication	good
Nashville EFO	AirLink RV50	Remote Communication	good
Blountville	AirLink RV50	Remote Communication	good
Nashville EFO	AirLink RV50	Remote Communication	good
Dyersburg	AirLink RV50	Remote Communication	good
Jackson (Old)	AirLink RV50	Remote Communication	good
Fairview	AirLink RV50	Remote Communication	good
Nashville EFO	Air Compressor	0.5 HP	good

Nashville EFO	Air Compressor	0.5 HP	good
Nashville EFO	Ozone Calibrator	703E Ozone Calibrator	good
Nashville EFO	Ozone Calibrator	703E Ozone Calibrator	good
Nashville EFO	Ozone Calibrator	703E Ozone Calibrator	good
Nashville EFO	Ozone Calibrator	703E Ozone Calibrator	good
Nashville EFO	Ozone Calibrator	703E Ozone Calibrator	good
Nashville EFO	Ozone Calibrator	703E Ozone Calibrator	good
Freels Bend	Ozone Calibrator	703E Ozone Calibrator	good
New Market	Ozone Calibrator	703E Ozone Calibrator	good
Loudon	Ozone Calibrator	703E Ozone Calibrator	good
Blountville	Ozone Calibrator	703E Ozone Calibrator	good
Kingsport O3	Ozone Calibrator	703E Ozone Calibrator	good
Cedars	Ozone Calibrator	703E Ozone Calibrator	good
Hendersonville	Ozone Calibrator	703E Ozone Calibrator	good
Fairview	Ozone Calibrator	703E Ozone Calibrator	good
Kingsport	Data logger	Agilaire 8872	good
Kingsport	Data logger	Agilaire 8872	good
Nashville EFO	Data logger	Agilaire 8872	good
Nashville EFO	Data logger	Agilaire 8872	good
Kingsport	Data logger	Agilaire 8872	good
Nashville EFO	Data logger	Agilaire 8872	good
Nashville EFO	Data logger	Agilaire 8872	good
Freels Bend	Data logger	Agilaire 8872	good
New Market	Data logger	Agilaire 8872	good
Fairview	Data logger	Agilaire 8872	good
Kingsport	Data logger	Agilaire 8872	good
Loudon	Data logger	Agilaire 8872	good
Blountville	Data logger	Agilaire 8872	good
Cedars	Data logger	Agilaire 8872	good
Hendersonville	Data logger	Agilaire 8872	good
Cedars of Lebanon	Shelter One AQM	Air Quality Monitoring Shelter	good
Kingsport	Shelter One AQM	Air Quality Monitoring Shelter	good
Blountville	Shelter One AQM	Air Quality Monitoring Shelter	good
Kingsport	Shelter One AQM	Air Quality Monitoring Shelter	good
Kingsport	Shelter One AQM	Air Quality Monitoring Shelter	good
New Market	Shelter One AQM	Air Quality Monitoring Shelter	good
Freels Bend	Shelter One AQM	Air Quality Monitoring Shelter	good
Loudon Elementary School	Shelter One AQM	Air Quality Monitoring Shelter	good
Fairview	Shelter One AQM	Air Quality Monitoring Shelter	good
Hendersonville	Shelter One AQM	Air Quality Monitoring Shelter	good
Knoxville	Gas Analyzer	API 400E	good
Nashville EFO	Gas Analyzer	API 400E	good
Athens	PM 2.5 Continuous	BAM 1022, FEM PM 2.5	good
Clarksville	PM 2.5 Continuous	BAM 1022, FEM PM 2.5	good

Columbia	PM 2.5 Continuous	BAM 1022, FEM PM 2.5	good
Cookeville	PM 2.5 Continuous	BAM 1022, FEM PM 2.5	good
Dyersburg	PM 2.5 Continuous	BAM 1022, FEM PM 2.5	good
Harriman	PM 2.5 Continuous	BAM 1022, FEM PM 2.5	good
Hendersonville -1	PM 2.5 Continuous	BAM 1022, FEM PM 2.5	good
Jackson	PM 2.5 Continuous	BAM 1022, FEM PM 2.5	good
Kingsport	PM 2.5 Continuous	BAM 1022, FEM PM 2.5	good
Loretto	PM 2.5 Continuous	BAM 1022, FEM PM 2.5	good
Loudon - 1	PM 2.5 Continuous	BAM 1022, FEM PM 2.5	good
Loudon - 2	PM 2.5 Continuous	BAM 1022, FEM PM 2.5	good
Maryville	PM 2.5 Continuous	BAM 1022, FEM PM 2.5	good
Hendersonville	PM 2.5 Continuous	BAM 1022, FEM PM 2.5	good
Fairview	PM 2.5 Continuous	BAM 1022, FEM PM 2.5	good
Nashville EFO	PM 2.5 Continuous	BAM 1022, FEM PM 2.5	good
Nashville EFO	PM 2.5 Continuous	BAM 1022, FEM PM 2.5	good
Nashville EFO	PM 2.5 Continuous	BAM 1022, FEM PM 2.5	good
Nashville EFO	PM 2.5 Continuous	BAM 1022, FEM PM 2.5	good
Nashville EFO	Flow Check Device	BGI Challenger	good
Nashville EFO	Flow Check Device	BGI TetraCal	good
Nashville EFO	Flow Check Device	BGI TetraCal	good
Nashville EFO	Reference Device - Flow	Challenger	good
Quality Assurance	Multi-gas calibrator	Environics 6100	good
Quality Assurance	Multi-gas calibrator	Environics Calibrator 6103	good
Quality Assurance	Multi-gas calibrator	Environics Calibrator 6103	good
Quality Assurance	Multi-gas calibrator	Environics Calibrator 6103	good
Nashville EFO	PM 2.5 Filter Based	FRM 2025	good
Nashville EFO	PM 2.5 Filter Based	FRM 2025	good
Nashville EFO	PM 2.5 Filter Based	FRM 2025	good
Hendersonville -2	PM 2.5 Filter Based	FRM 2025i	good
Nashville EFO	PM 2.5 Filter Based	FRM 2025i	good
Nashville EFO	HiVol TSP/Lead	GMW Housing	good
Bristol	HiVol TSP/Lead	GMW Housing	good
Bristol	HiVol TSP/Lead	GMW Housing	good
SO2 cylinder (JJ13627)	Gas Cylinder	Happy Hill	good
Nashville EFO	QA ExTech Manometer	HD 700	good
Nashville EFO	QA ExTech Manometer	HD 700	good
Bristol	Exide	HiVol TSP/Lead (Tisch Housing)	good
Bristol	Exide	HiVol TSP/Lead (Tisch Housing)	good
Nashville EFO	Nashville EFO	HiVol TSP/Lead (Tisch Housing)	good
Bristol	Exide	HiVol TSP/Lead (Tisch Housing)	good

Bristol	Hi-Vol variable orifice	Kit #9	good
Nashville EFO	Flow bench standard	Mesa Labs Drycal	good
Nashville EFO	Flow bench standard	Mesa Labs Drycal	good
SO2 cylinder (JJ12455)	Gas Cylinder	Nashville EFO	good
SO2 cylinder (JJ12455)	Gas Cylinder	Nashville EFO	good
Multi-Gas (FA01131)	Gas Cylinder	Nashville EFO	good
Multi-Gas (FA02370)	Gas Cylinder	Nashville EFO	good
Multi-Gas (CLM005225)	Gas Cylinder	Nashville EFO	good
SO2 Cylinder JJ14752	Gas Cylinder	Nashville EFO	good
SO2 Cylinder(-FB03900)	Gas Cylinder	Nashville EFO	good
Nashville EFO	HiVol calibration	Orifice, variable;	good
Nashville EFO	Zero air supply	Portable T751H	good
Nashville EFO	Zero air supply	Portable T751H	good
Nashville EFO	Zero air supply	Portable T751H	good
Nashville EFO	Zero air supply	Portable T751H	good
Quality Assurance	Equinox, SUV	QA Vehicle	good
Nashville EFO	Orifice certification HiVol	Roots meter	good
Nashville EFO	Orifice certification HiVol	Roots meter	good
SO2 cylinder	Gas Cylinder	Ross N Robinson	good
Nashville EFO	Reference Device	(Aircheck 224-PCXR7-513280)	good
Nashville EFO	Reference Device	(Aircheck 224-PCXR7-513391)	good
Nashville EFO	Reference Device	(Aircheck 224-PCXR7-513768)	good
SO2 cylinder (JJ8649)	Gas Cylinder	Skyland Dr.	good
Skyland Drive	34-foot tower	SO2 site	good
Johnson City	Flow Check Device	Streamline Pro	good
Quality Assurance	Flow Check Device	Streamline Pro	good
Quality Assurance	Flow Check Device	Streamline Pro	good
Quality Assurance	Flow Check Device	Streamline Pro	good
Knoxville	Flow Check Device	Streamline Pro	good
Jackson	Flow Check Device	Streamline Pro	good
NEFO Nashville EFO	Flow Check Device	Streamline Pro	good
NEFO Nashville EFO	Flow Check Device	Streamline Pro	good
NEFO Nashville EFO	Flow Check Device	Streamline Pro	good
Nashville EFO	Flow Check Device	Streamline Pro	good
Jackson	Flow Check Device	Streamline Pro	good
Loretto	Flow Check Device	Streamline Pro	good
Cookeville	Flow Check Device	Streamline Pro	good
Johnson City	Flow Check Device	Streamline Pro	good
NEFO Nashville EFO	Flow Check Device	Streamline Pro	good
Chattanooga	Flow Check Device	Streamline Pro	good
Nashville EFO	Flow Check Device	Streamline Pro	good
Nashville EFO	Flow Check Device	Streamline Pro	good

Nashville EFO	Flow Check Device	Streamline Pro	good
Nashville EFO	Flow Check Device	Streamline Pro	good
Nashville EFO	Flow Check Device	Streamline Pro	good
Johnson City	Flow Check Device	Streamline Pro	good
Nashville EFO	Flow Check Device	Streamline Pro	good
Nashville EFO	Flow Check Device	Streamline Pro	good
Nashville EFO	Flow Check Device	Streamline Pro	good
Nashville EFO	Flow Check Device	Streamline Pro	good
Nashville EFO	Flow Check Device	Streamline Pro	good
Nashville EFO	Teledyne CO analyzer	T300u	good
Nashville EFO	Teledyne NO2 analyzer	T500u	good
Skyland Dr.	SO2 Calibrator	T700 SO2 Calibrator	good
Ross N Robinson	SO2 Calibrator	T700 SO2 Calibrator	good
Nashville EFO	SO2 Calibrator	T700 SO2 Calibrator	good
Nashville EFO	SO2 Calibrator	T700 SO2 Calibrator	good
Nashville EFO	SO2 Calibrator	T700 SO2 Calibrator	good
Nashville EFO	SO2 Calibrator	T700 SO2 Calibrator	good
Nashville EFO	SO2 Calibrator	T700 SO2 Calibrator	good
Happy Hill	SO2 Calibrator	T700 SO2 Calibrator	good
Andrew Johnson	SO2 Calibrator	T700 SO2 Calibrator	good
Nashville EFO	SO2 Calibrator	T700 SO2 Calibrator	good
Nashville EFO	SO2 Calibrator	T700 SO2 Calibrator	good
Nashville EFO	SO2 Calibrator	T700 SO2 Calibrator	good
Freels Bend	Zero air supply	T701 Zero Air Supply	good
New Market	Zero air supply	T701 Zero Air Supply	good
Loudon	Zero air supply	T701 Zero Air Supply	good
Blountville	Zero air supply	T701 Zero Air Supply	good
Kingsport Ozone	Zero air supply	T701 Zero Air Supply	good
Skyland Dr.	Zero air supply	T701 Zero Air Supply	good
Cedars	Zero air supply	T701 Zero Air Supply	good
Ross N Robinson	Zero air supply	T701 Zero Air Supply	good
Hendersonville	Zero air supply	T701 Zero Air Supply	good
Fairview	Zero air supply	T701 Zero Air Supply	good
Nashville EFO	Zero air supply	T701 Zero Air Supply	good
Nashville EFO	Zero air supply	T701 Zero Air Supply	good
Nashville EFO	Zero air supply	T701 Zero Air Supply	good
Nashville EFO	Zero air supply	T701 Zero Air Supply	good
Nashville EFO	Zero air supply	T701 Zero Air Supply	good
Nashville EFO	Zero air supply	T701 Zero Air Supply	good
Nashville EFO	Zero air supply	T701 Zero Air Supply	good
Nashville EFO	Zero air supply	T701 Zero Air Supply	good
Happy Hill	Zero air supply	T701 Zero Air Supply	good
Andrew Johnson	Zero air supply	T701 Zero Air Supply	good
Freels Bend	Ozone Calibrator	T703 Ozone Calibrator	good

New Market	Ozone Calibrator	T703 Ozone Calibrator	good
Loudon	Ozone Calibrator	T703 Ozone Calibrator	good
Blountville	Ozone Calibrator	T703 Ozone Calibrator	good
Kingsport Ozone	Ozone Calibrator	T703 Ozone Calibrator	good
Cedars	Ozone Calibrator	T703 Ozone Calibrator	good
Hendersonville	Ozone Calibrator	T703 Ozone Calibrator	good
Fairview	Ozone Calibrator	T703 Ozone Calibrator	good
Nashville EFO	Ozone Calibrator	T703 Ozone Calibrator	good
Nashville EFO	Ozone Calibrator	T703 Ozone Calibrator	good
Nashville EFO	Ozone Calibrator	T703 Ozone Calibrator	good
Nashville EFO	Ozone Calibrator	T703 Ozone Calibrator	good
Nashville EFO	Ozone Calibrator	T703 Ozone Calibrator	good
Nashville EFO	Ozone Calibrator	T703 Ozone Calibrator	good
Nashville EFO	Multi-gas calibrator	T750U	good
Nashville EFO	Multi-gas calibrator	T750U	good
Nashville EFO	Multi-gas calibrator	T750U	good
Nashville EFO	Multi-gas calibrator	T750U	good
Nashville EFO	Multi-gas calibrator	T750U	good
Nashville EFO	Multi-gas calibrator	T750U	good
Nashville EFO	Multi-gas calibrator	T750U	good
Freels Bend	Multi-gas calibrator	T750U	good
Nashville EFO	Ozone analyzer	TEI 49i (ref photometer)	good
Nashville EFO	Ozone analyzer	TEI 49i (ref photometer)	good
Nashville EFO	Ozone analyzer	Teledyne 400E	good
Nashville EFO	Ozone analyzer	Teledyne 400E	good
Nashville EFO	Ozone analyzer	Teledyne 400E	good
Nashville EFO	SO2 Analyzer	Teledyne M100E	good
Nashville EFO	SO2 Analyzer	Teledyne M100E	good
Nashville EFO	SO2 Analyzer	Teledyne M100E	good
Nashville EFO	SO2 Analyzer	Teledyne T100	good
Nashville EFO	SO2 Analyzer	Teledyne T100	good
Nashville EFO	SO2 Analyzer	Teledyne T100	good
Andrew Johnson	SO2 Analyzer	Teledyne T100	good
Andrew Johnson	SO2 Analyzer	Teledyne T100	good
Happy Hill	SO2 Analyzer	Teledyne T100	good
Nashville EFO	SO2 Analyzer	Teledyne T100	good
Nashville EFO	SO2 Analyzer	Teledyne T100	good
Nashville EFO	SO2 Analyzer	Teledyne T100	good
Ross N Robinson	SO2 Analyzer	Teledyne T100	good
Skyland Drive	SO2 Analyzer	Teledyne T100	good
Freel's Bend	Ozone analyzer	Teledyne T400 O3 analyzer	good
Nashville EFO	Ozone analyzer	Teledyne T400 O3 analyzer	good
Nashville EFO	Ozone analyzer	Teledyne T400 O3 analyzer	good
Nashville EFO	Ozone analyzer	Teledyne T400 O3 analyzer	good

Nashville EFO	Ozone analyzer	Teledyne T400 O3 analyzer	good
Nashville EFO	Ozone analyzer	Teledyne T400 O3 analyzer	good
New Market	Ozone analyzer	Teledyne T400 O3 analyzer	good
Loudon	Ozone analyzer	Teledyne T400 O3 analyzer	good
Blountville	Ozone analyzer	Teledyne T400 O3 analyzer	good
Hendersonville	Ozone analyzer	Teledyne T400 O3 analyzer	good
Kingsport	Ozone analyzer	Teledyne T400 O3 analyzer	good
Fairview	Ozone analyzer	Teledyne T400 O3 analyzer	good
Nashville EFO	Ozone analyzer	Teledyne T400 O3 analyzer	good
Quality Assurance	Multi-gas calibrator	Teledyne T750U	good
Quality Assurance	Multi-gas calibrator	Teledyne T750U	good
Quality Assurance	Multi-gas calibrator	Teledyne T750U	good
Quality Assurance	Multi-gas calibrator	Teledyne T750U	good
Quality Assurance	Multi-gas calibrator	Teledyne T750U	good
Nashville EFO	Flow Check Device	Tetracal, for TEOM	good
Nashville EFO	Flow Check Device	Tetracal, for TEOM	good

Appendix B Tennessee Monitoring Site Agreement Letters

Kentucky

Department of Environment & Conservation

April 22, 2019

Ms. Melissa Duff, Director
Kentucky Division for Air Quality
Kentucky Department for Environmental Protection
300 Sower Boulevard
2nd Floor
Frankfort, KY 40601

Dear Ms. Duff:

The United States Environmental Protection Agency's (EPA) revised monitoring regulations found in 40 CFR Part 58, Appendix D state in part: "The EPA recognizes that there may be situations where the EPA Regional Administrator and the affected State or local agencies may need to augment or divide the overall MSA/CSA monitoring responsibilities and requirements among these various agencies to achieve an effective network design. Full monitoring requirements apply separately to each affected State or local agency in the absence of an agreement between the affected agencies and the EPA Regional Administrator." This revision of the CFR also describes the minimum monitoring requirements for the NAAQS pollutants. Tennessee and Kentucky share the Clarksville, TN-KY MSA, which is comprised of Trigg and Christian counties in Kentucky and Montgomery County in Tennessee. The US Census Bureau estimates a 2017 population of just over 285K; in 2010, the census population was in excess of 260K.

CBSA Code	Geographic Area	Legal/Statistical Area Description	July 1, 2017 Estimate	2010 Census
17300	Clarksville, TN-KY	Metropolitan Statistical Area	285,042	260,625

The Tennessee Division of Air Pollution Control (TDEC DAPC) previously operated one (1) $PM_{2.5}$ FRM manual sampler and a $PM_{2.5}$ continuous monitor at site 47-125-1009. TDEC DAPC has relocated this site due to safety related concerns and now operates one (1) $PM_{2.5}$ FEM continuous monitor at the new monitoring site (47-125-2001). The new site provides sufficient characterization of the particulate air quality in the entire Clarksville, TN-KY MSA to comply with the requirements for both population and concentration based monitoring identified in the regulations found at 40 CFR 58, Appendix D. The relocated Clarksville monitoring site (47-125-2001) began collecting and reporting data on April 1, 2019.

Department of Environment & Conservation

TDEC DAPC would like to invite Kentucky's Division for Air Quality to participate in Tennessee's annual ambient air monitoring network review. Tennessee commits to notifying Kentucky of any future proposed monitor relocations or monitor shutdowns in the Clarksville, TN-KY MSA so that arrangements can be made to ensure that the MSA monitoring requirements are being met. TDEC DAPC received approval from EPA to relocate the Clarksville $PM_{2.5}$ site (47-125-1009) in Clarksville, TN during CY 2018. If you have technical questions contact Bradley King at 615-687-7042 or Bradley.King@tn.gov. I may be contacted at 615-532-9668 or Michelle.B.Walker@tn.gov.

Sincerely,

Michelle W. Owenby

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

Division of Air Pollution Control
William Snodgrass Tennessee Tower • 15th Floor • Nashville, TN 37243
312 Rosa L. Parks Avenue • Nashville, TN 37243
Tel: 615-532-0554 • Fax: 615-532-0614
Air.Pollution.Control@tn.gov

Virginia

Department of Environment & Conservation

April 22, 2019

Michael Dowd
Director of Air Division
Virginia Department of Environmental Quality
P.O. Box 1105
Richmond, VA 23218

Dear Mr. Dowd:

The United States Environmental Protection Agency's (EPA) revised monitoring regulations found in 40 CFR Part 58, Appendix D state in part: "The EPA recognizes that there may be situations where the EPA Regional Administrator and the affected State or local agencies may need to augment or divide the overall MSA/CSA monitoring responsibilities and requirements among these various agencies to achieve an effective network design. Full monitoring requirements apply separately to each affected State or local agency in the absence of an agreement between the affected agencies and the EPA Regional Administrator." This revision of the CFR also describes the minimum monitoring requirements for the NAAQS pollutants. Tennessee and Virginia share the Kingsport-Bristol-Bristol, TN-VA MSA, which is comprised of Scott and Washington counties in Virginia, and Hawkins and Sullivan counties in Tennessee. The US Census Bureau estimates the 2017 population being under 307K; in 2010 the census population for the MSA was 309,544.

CBSA Code	Geographic Area	Legal/Statistical Area Description	2017 Estimate	2010 Census
28700	Kingsport-Bristol-Bristol, TN-VA MSA	Metropolitan Statistical Area	306,659	309,544

The Tennessee Division of Air Pollution Control (TDEC DAPC) previously operated one FRM $PM_{2.5}$ monitoring site (47-163-1007) two ozone monitoring sites (47-163-2002 and 47-163-2003), a lead monitoring site (47-163-3004) and two SO_2 monitoring sites; Skyland Drive (47-163-6002) and Ross N Robinson (47-163-6001) all in Sullivan County. These monitoring sites were sufficient to properly characterize the particular air quality in the Kingsport-Bristol-Bristol, TN-VA MSA and comply with the requirements for both population and concentration-based monitoring, identified in the revised

TN Department of Environment & Conservation

monitoring regulations found in 40 CFR Part 58, Appendix D.

The State of Tennessee has added two additional Sulfur dioxide (SO_2) monitoring sites during CY 2018 to the Kingsport SO_2 non-attainment area in Sullivan County, Tennessee. The new SO_2 monitoring sites located in the non-attainment area are Andrew Johnson Elementary (47-163-6003), and Happy Hill (47-163-6004). These two additional sites satisfy the need for additional SO2 monitoring as requested by EPA to supplement the State's attainment/maintenance plan and adequately characterize the nonattainment area providing "robust" monitoring in closer proximity to the maximum receptor areas as indicated in the modeling included with the attainment/maintenance plan. The State of Tennessee has replaced the PM2.5 2025 FRM monitor with a new BAM 1022 continuous monitor also during CY 2018.

This is to notify the Virginia Department of Environmental Quality that TDEC-DAPC has made significant upgrades to our existing Ozone monitoring sites in Sullivan County and have also established two new SO_2 monitoring sites in the Sullivan County non-attainment area and replaced the PM2.5 FRM manual sampler with an FEM continuous monitor These site updates and additional monitoring sites should be adequate to meet the entire MSA monitoring requirements.

TDEC DAPC would like to invite Virginia Department of Environmental Quality to participate in Tennessee's annual ambient air monitoring network review. Tennessee commits to notifying Virginia of any future proposed monitor relocations or monitor shutdowns in the Kingsport-Bristol-Bristol, TN-VA MSA so that arrangements can be made to ensure that the MSA monitoring requirements are being met.
If you have any technical questions please contact Bradley King at 615-687-7042 or Bradley.King@tn.gov. I may be contacted at 615-532-9668 or Michelle.B.Walker@tn.gov.

Sincerely,

Michelle W. Owenby

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

Division of Air Pollution Control
William Snodgrass Tennessee Tower • 15th Floor • Nashville, TN 37243
312 Rosa L. Parks Avenue • Nashville, TN 37243
Tel: 615-532-0554 • Fax: 615-532-0614
Air.Pollution.Control@tn.gov

SHELBY COUNTY HEALTH DEPARTMENT

LEE HARRIS
MAYOR

ALISA R. HAUSHALTER, DNP, RN, PHNA-BC
DIRECTOR

BRUCE RANDOLPH, MD, MPH
HEALTH OFFICER

Public Health
Prevent. Promote. Protect.

April 15th, 2020

Ms. Michelle Walker Owenby, Air Director
Tennessee Department of Environment and Conservation
Air Pollution Control Division
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Ave., 15th Floor
Nashville, TN 37243-1531

APC RCVD
23 APR 2020 AM 10:28

Mr. Chad LaFontaine, Air Director
Mississippi Department of Environmental Quality
Office of Pollution Control, Air Division
P.O. Box 2261
Jackson, MS 39201

Mr. William K. Montgomery, Interim Associate Director
Arkansas Department of Environmental Quality
Office of Air Quality
5301 Northshore Dr.
North Little Rock, AR 72118-5317

Dear All,

In accordance with the provisions of the Memorandum of Agreement (MOA) signed in May and June of 2008 between the Shelby County Health Department (SCHD), Mississippi Department of Environmental Quality (MDEQ) and the Arkansas Department of Environmental Quality (ADEQ), this letter serves as a notification that no changes have been made in our current network.

If your agencies do not have current changes to the Network or may be contemplating changes in the near future, please notify the respective agencies of your intentions.

If you have any questions, please call me at (901) 222-9599.

Sincerely,

Robert Rogers

Robert Rogers, P.E. / Technical Manager
Pollution Control Section
Shelby County Health Department

Mission
To promote, protect and improve the health and environment of all Shelby County residents.

814 Jefferson Avenue♦ Memphis, TN 38105♦ 901 222-9000♦ www.shelbytnhealth.com

MEMORANDUM OF AGREEMENT
ON AIR QUALITY MONITORING FOR CRITERIA POLLUTANTS FOR THE MEMPHIS, TN- MS- AR METROPOLITAN STATISTICAL AREA (MSA)

Participating Agencies:

Shelby County Health Department (SCHD)
Air Pollution Control Program

Mississippi Department of Environmental Quality (MDEQ)
Office of Pollution Control, Air Division

Arkansas Department of Environmental Quality (ADEQ)

PURPOSE / OBJECTIVE / GOALS

The purpose of this Memorandum of Agreement (MOA) is to inform the entities of the Memphis, Tennessee-Mississippi-Arkansas Metropolitan Statistical Area of monitoring network changes. The MOA between SCHD, MDEQ, and ADEQ is to collectively meet United States Environmental Protection Agency (EPA) minimum monitoring requirements for particles of an aerodynamic diameter of 10 micrometers and less (PM_{10}), particles of an aerodynamic diameter of 2.5 micrometers and less ($PM_{2.5}$), and ozone; as well as other criteria pollutants air quality monitoring deemed necessary to meet the needs of the MSA as determined reasonable by all parties. This MOA will formalize and reaffirm the collective agreement in order to provide adequate criteria pollutant monitoring for the Memphis, TN-MS-AR MSA as required by 40 CFR 58 Appendix D, Section 2, (e).

PM 2.5 MSA monitoring network include:

County	Federal Referenced Method $PM_{2.5}$	Continuous $PM_{2.5}$	Speciation $PM_{2.5}$	Collocated $PM_{2.5}$
Shelby County, TN **SCHD**	3 (includes 1 at the Near Road Station)	1	1	1
Crittenden County , AR **ADEQ**	1	1		
DeSoto County, MS **MDEQ**	1	1		1

Criteria Air Pollutant MSA monitoring network include:

County	PM_{10}	O_3	$NO_x/NO/NO_2$	CO	SO_2
Shelby County, TN **SCHD**	2 (includes low volume PM_{10} at NCore)	3	1 (includes 1 at the Near Road Station)	2 (includes 1 trace at NCore and 1 trace at the Near Road Station)	1 (trace at NCore)
Crittenden County , AR **ADEQ**		1	1		
DeSoto County, MS **MDEQ**		1			

RESPONSIBILITIES / ACTIONS

Each of the parties to this Agreement is responsible for ensuring that its obligations under the MOA are met. As conditions warrant, the affected agencies may conduct telephone conference calls, meetings, or other communications to discuss monitoring activities for the MSA. Each affected agency shall inform the other affected agencies via telephone or email of any monitoring changes occurring within its jurisdiction of the MSA at its earliest convenience, after learning of the need for the change or making the changes. Such unforeseen changes may include evictions from monitoring sites,

destruction of monitoring sites due to natural disasters, or any occurrences that result in an extended (greater than one quarter) or permanent change in the monitoring network.

LIMITATIONS

- All commitments made in this MOA are subject to the availability of appropriated funds and each agency's budget priorities. Nothing in this MOA obligates SCHD, MDEQ, or ADEQ to expend appropriations or to enter into any contract, assistance agreement, interagency agreement or other financial obligation.
- This MOA is neither a fiscal nor a funds obligation document. Any endeavor involving reimbursement or contribution of funds between parties to this agreement will be handled in accordance with applicable laws, regulations, and procedures, and will be subject to separate agreements that will be affected in writing by representatives of the parties.
- This MOA does not create any right or benefit enforceable by law or equity against SCHD, MDEQ, or ADEQ, their officers or employees, or any other person. This MOA does not apply to any entity outside SCHD, MDEQ, or ADEQ.
- No proprietary information or intellectual property is anticipated to arise out of this MOA.

TERMINATION

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

Appendix C Sections of the CFR Referred to in the 2020/21 AMNP

§ 58.10 Annual monitoring network plan and periodic network assessment.

(a)

(1) Beginning July 1, 2007, the state, or where applicable local, agency shall submit to the Regional Administrator an annual monitoring network plan which shall provide for the documentation of the establishment and maintenance of an air quality surveillance system that consists of a network of SLAMS monitoring stations that can include FRM, FEM, and ARM monitors that are part of SLAMS, NCore, CSN, PAMS, and SPM stations. The plan shall include a statement of whether the operation of each monitor meets the requirements of appendices A, B, C, D, and E of this part, where applicable. The Regional Administrator may require additional information in support of this statement. The annual monitoring network plan must be made available for public inspection and comment for at least 30 days prior to submission to the EPA and the submitted plan shall include and address, as appropriate, any received comments.

(2) Any annual monitoring network plan that proposes network modifications (including new or discontinued monitoring sites, new determinations that data are not of sufficient quality to be compared to the NAAQS, and changes in identification of monitors as suitable or not suitable for comparison against the annual PM2.5 NAAQS) to SLAMS networks is subject to the approval of the EPA Regional Administrator, who shall approve or disapprove the plan within 120 days of submission of a complete plan to the EPA.

(3) The plan for establishing required NCore multipollutant stations shall be submitted to the Administrator not later than July 1, 2009. The plan shall provide for all required stations to be operational by January 1, 2011.

(4) A plan for establishing source-oriented Pb monitoring sites in accordance with the requirements of appendix D to this part for Pb sources emitting 1.0 tpy or greater shall be submitted to the EPA Regional Administrator no later than July 1, 2009, as part of the annual network plan required in paragraph (a)(1) of this section. The plan shall provide for the required source oriented Pb monitoring sites for Pb sources emitting 1.0 tpy or greater to be operational by January 1, 2010. A plan for establishing source-oriented Pb monitoring sites in accordance with the requirements of appendix D to this part for Pb sources emitting equal to or greater than 0.50 tpy but less than 1.0 tpy shall be submitted to the EPA Regional Administrator no later than July 1, 2011. The plan shall provide for the required source oriented Pb monitoring sites for Pb sources emitting equal to or greater than 0.50 tpy but less than 1.0 tpy to be operational by December 27, 2011.

(5)

(i) A plan for establishing or identifying an area wide NO2 monitor, in accordance with the requirements of Appendix D, section 4.3.3 to this part, shall be submitted as part of the Annual Monitoring Network Plan to the EPA Regional Administrator by July 1, 2012. The plan shall provide for these required monitors to be operational by January 1, 2013.

(ii) A plan for establishing or identifying any NO2 monitor intended to characterize vulnerable and susceptible populations, as required in Appendix D, section 4.3.4 to this part, shall be submitted as part of the Annual Monitoring Network Plan to the EPA Regional Administrator by July 1, 2012. The plan shall provide for these required monitors to be operational by January 1, 2013.

(iii) A plan for establishing a single near-road NO2 monitor in CBSAs having 1,000,000 or more persons, in accordance with the requirements of Appendix D, section 4.3.2 to this part, shall be submitted as part of the Annual Monitoring Network Plan to the EPA Regional Administrator by July 1, 2013. The plan shall provide for these required monitors to be operational by January 1, 2014.

(iv) A plan for establishing a second near-road NO2 monitor in any CBSA with a population of 2,500,000 persons or more, or a second monitor in any CBSA with a population of 1,000,000 or more persons that has one or more roadway segments with 250,000 or greater AADT counts, in accordance with the requirements of appendix D, section 4.3.2 to this part, shall be submitted as part of the Annual Monitoring Network Plan to the EPA Regional

Administrator by July 1, 2014. The plan shall provide for these required monitors to be operational by January 1, 2015.

(6) A plan for establishing SO2 monitoring sites in accordance with the requirements of appendix D to this part shall be submitted to the EPA Regional Administrator by July 1, 2011 as part of the annual network plan required in paragraph (a) (1). The plan shall provide for all required SO2 monitoring sites to be operational by January 1, 2013.

(7) A plan for establishing CO monitoring sites in accordance with the requirements of appendix D to this part shall be submitted to the EPA Regional Administrator. Plans for required CO monitors shall be submitted at least six months prior to the date such monitors must be established as required by section 58.13.

(8)

(i) A plan for establishing near-road PM 2.5 monitoring sites in CBSAs having 2.5 million or more persons, in accordance with the requirements of appendix D to this part, shall be submitted as part of the annual monitoring network plan to the EPA Regional Administrator by July 1, 2014. The plan shall provide for these required monitoring stations to be operational by January 1, 2015.

(ii) A plan for establishing near-road PM 2.5 monitoring sites in CBSAs having 1 million or more persons, but less than 2.5 million persons, in accordance with the requirements of appendix D to this part, shall be submitted as part of the annual monitoring network plan to the EPA Regional Administrator by July 1, 2016. The plan shall provide for these required monitoring stations to be operational by January 1, 2017.

(9) The annual monitoring network plan shall provide for the required O3 sites to be operating on the first day of the applicable required O3 monitoring season in effect on January 1, 2017 as listed in Table D-3 of appendix D of this part.

(10) A plan for making Photochemical Assessment Monitoring Stations (PAMS) measurements, if applicable, in accordance with the requirements of appendix D paragraph 5(a) of this part shall be submitted to the EPA Regional Administrator no later than July 1, 2018. The plan shall provide for the required PAMS measurements to begin by June 1, 2019.

(11) An Enhanced Monitoring Plan for O3, if applicable, in accordance with the requirements of appendix D paragraph 5(h) of this part shall be submitted to the EPA Regional Administrator no later than October 1, 2019 or two years following the effective date of a designation to a classification of Moderate or above O3 nonattainment, whichever is later.

(12) A detailed description of the PAMS network being operated in accordance with the requirements of appendix D to this part shall be submitted as part of the annual monitoring network plan for review by the EPA Administrator. The PAMS Network Description described in section 5 of appendix D may be used to meet this requirement.

(b) The annual monitoring network plan must contain the following information for each existing and proposed site:

(1) The AQS site identification number.

(2) The location, including street address and geographical coordinates.

(3) The sampling and analysis method(s) for each measured parameter.

(4) The operating schedules for each monitor.

(5) Any proposals to remove or move a monitoring station within a period of 18 months following plan submittal.

(6) The monitoring objective and spatial scale of representativeness for each monitor as defined in appendix D to this part.

(7) The identification of any sites that are suitable and sites that are not suitable for comparison against the annual PM 2.5 NAAQS as described in § 58.30.

(8) The MSA, CBSA, CSA or other area represented by the monitor.

(9) The designation of any Pb monitors as either source-oriented or non-source-oriented according to Appendix D to 40 CFR part 58.

(10) Any source-oriented monitors for which a waiver has been requested or granted by the EPA Regional Administrator as allowed for under paragraph 4.5(a)(ii) of Appendix D to 40 CFR part 58.

(11) Any source-oriented or non-source-oriented site for which a waiver has been requested or granted by the EPA Regional Administrator for the use of Pb-PM 10 monitoring in lieu of Pb-TSP monitoring as allowed for under paragraph 2.10 of Appendix C to 40 CFR part 58.

(12) The identification of required NO2 monitors as near-road, area-wide, or vulnerable and susceptible population monitors in accordance with Appendix D, section 4.3 of this part.

(13) The identification of any PM 2.5 FEMs and/or ARMs used in the monitoring agency's network where the data are not of sufficient quality such that data are not to be compared to the NAAQS. For required SLAMS where the agency identifies that the PM 2.5 Class III FEM or ARM does not produce data of sufficient quality for comparison to the NAAQS, the monitoring agency must ensure that an operating FRM or filter-based FEM meeting the sample frequency requirements described in § 58.12 or other Class III PM 2.5 FEM or ARM with data of sufficient quality is operating and reporting data to meet the network design criteria described in appendix D to this part.

(c) The annual monitoring network plan must document how state and local agencies provide for the review of changes to a PM 2.5 monitoring network that impact the location of a violating PM 2.5 monitor. The affected state or local agency must document the process for obtaining public comment and include any comments received through the public notification process within their submitted plan.

(d) The state, or where applicable local, agency shall perform and submit to the EPA Regional Administrator an assessment of the air quality surveillance system every 5 years to determine, at a minimum, if the network meets the monitoring objectives defined in appendix D to this part, whether new sites are needed, whether existing sites are no longer needed and can be terminated, and whether new technologies are appropriate for incorporation into the ambient air monitoring network. The network assessment must consider the ability of existing and proposed sites to support air quality characterization for areas with relatively high populations of susceptible individuals (e.g., children with asthma), and, for any sites that are being proposed for discontinuance, the effect on data users other than the agency itself, such as nearby states and tribes or health effects studies. The state, or where applicable local, agency must submit a copy of this 5-year assessment, along with a revised annual network plan, to the Regional Administrator. The assessments are due every five years beginning July 1, 2010.

(e) All proposed additions and discontinuations of SLAMS monitors in annual monitoring network plans and periodic network assessments are subject to approval according to § 58.14.

[71 FR 61298, Oct. 17, 2006, as amended at 72 FR 32210, June 12, 2007; 73 FR 67059, Nov. 12, 2008; 73 FR 77517, Dec. 19, 2008; 75 FR 6534, Feb. 9, 2010; 75 FR 35601, June 22, 2010; 75 FR 81137, Dec. 27, 2010; 76 FR 54341, Aug. 31, 2011; 78 FR 16188, Mar. 14, 2013; 78 FR 3282, Jan. 15, 2013; 80 FR 65466, Oct. 26, 2015; 81 FR 17279, Mar. 28, 2016; 81 FR 96388, Dec. 30, 2016]

Appendix D Monitoring Network Requirements

Ozone Monitoring Network Requirements

40 CFR 58 Subpart G, Appendix D to Part 58 current as of April 3, 2020

4.1 Ozone (O3) Design Criteria. (a) State, and where appropriate, local agencies must operate O3 sites for various locations depending upon area size (in terms of population and geographic characteristics) and typical peak concentrations (expressed in percentages below, or near the O3 NAAQS). Specific SLAMS O3 site minimum requirements are included in Table D-2 of this appendix. The NCore sites are expected to complement the O3 data collection that takes place at single-pollutant SLAMS sites, and both types of sites can be used to meet the network minimum requirements. The total number of O3 sites needed to support the basic monitoring objectives of public data reporting, air quality mapping, compliance, and understanding O3-related atmospheric processes will include more sites than these minimum numbers required in Table D-2 of this appendix. The EPA Regional Administrator and the responsible State or local air monitoring agency must work together to design and/or maintain the most appropriate O3 network to service the variety of data needs in an area.

TABLE D–2 OF APPENDIX D TO PART 58 SLAMS MINIMUM O_3 MONITORING REQUIREMENTS

MSA population[1, 2]	**Most recent 3-year design value concentrations ≥85% of any O_3 NAAQS[3]**	**Most recent 3-year design value concentrations <85% of any O_3 NAAQS[3,4]**
>10 million	4	2
4–10 million	3	1
350,000–<4 million	2	1
50,000–<350,000 [5]	1	0

1. Minimum monitoring requirements apply to the metropolitan statistical area (MSA).

2. Population based on latest available census figures.

3. The ozone (O_3) National Ambient Air Quality Standards (NAAQS) levels and forms are defined in 40 CFR part 50.

4. These minimum monitoring requirements apply in the absence of a design value.

5. Metropolitan statistical areas (MSA) must contain an urbanized area of 50,000 or more population.

(b) Within an O3 network, at least one O3 site for each MSA, or CSA if multiple MSAs are involved, must be designed to record the maximum concentration for that particular metropolitan area. More than one maximum concentration site may be necessary in some areas. Table D-2 of this appendix does not account for the full breadth of additional factors that would be considered in designing a complete O3 monitoring program for an area. Some of these additional factors include geographic size, population density, complexity of terrain and meteorology, adjacent O3 monitoring programs, air pollution transport from neighboring areas, and measured air quality in comparison to all forms of the O3 NAAQS (i.e., 8-hour and 1-hour forms). Networks must be designed to account for all of these area characteristics. Network designs must be re-examined in periodic network assessments. Deviations from the above O3 requirements are allowed if approved by the EPA Regional Administrator.

CO Monitoring Network Requirements

40 CFR 58 Subpart G, Appendix D to Part 58 revised on December 30, 2016

4.2.1 General Requirements. (a) Except as provided in subsection (b), one CO monitor is required to operate collocated with one required near-road NO2 monitor, as required in Section 4.3.2 of this part, in CBSAs having a population of 1,000,000 or more persons. If a CBSA has more than one required near-road NO2 monitor, only one CO monitor is required to be collocated with a near-road NO2 monitor within that CBSA.

(b) If a state provides quantitative evidence demonstrating that peak ambient CO concentrations would occur in a near-road location which meets microscale siting criteria in Appendix E of this part but is not a near-road NO2 monitoring site, then the EPA Regional Administrator may approve a request by a state to use such an alternate near-road location for a CO monitor in place of collocating a monitor at near-road NO2 monitoring site.

NO_2 Monitoring Network Requirements

40 CFR 58 Subpart G, Appendix D to Part 58 revised on December 30, 2016

4.3.2 Requirement for Near-road NO_2 Monitors

(a) Within the NO2 network, there must be one microscale near-road NO2 monitoring station in each CBSA with a population of 1,000,000 or more persons to monitor a location of expected maximum hourly concentrations sited near a major road with high AADT counts as specified in paragraph 4.3.2(a)(1) of this appendix. An additional near-road NO2 monitoring station is required for any CBSA with a population of 2,500,000 persons or more, or in any CBSA with a population of 1,000,000 or more persons that has one or more roadway segments with 250,000 or greater AADT counts to monitor a second location of expected maximum hourly concentrations. CBSA populations shall be based on the latest available census figures.

(1) The near-road NO2 monitoring sites shall be selected by ranking all road segments within a CBSA by AADT and then identifying a location or locations adjacent to those highest ranked road segments, considering fleet mix, roadway design, congestion patterns, terrain, and meteorology, where maximum hourly NO2 concentrations are expected to occur and siting criteria can be met in accordance with appendix E of this part. Where a state or local air monitoring agency identifies multiple acceptable candidate sites where maximum hourly NO2 concentrations are expected to occur, the monitoring agency shall consider the potential for population exposure in the criteria utilized to select the final site location. Where one CBSA is required to have two near-road NO2 monitoring stations, the sites shall be differentiated from each other by one or more of the following factors: fleet mix; congestion patterns; terrain; geographic area within the CBSA; or different route, interstate, or freeway designation.

(b) Measurements at required near-road NO2 monitor sites utilizing chemiluminescence FRMs must include at a minimum: NO, NO2, and NOX.

SO_2 Monitoring Network Requirements

40 CFR 58 Subpart G, Appendix D to Part 58 revised on December 30, 2016

4.4 Sulfur Dioxide (SO_2) Design Criteria.

4.4.1 General Requirements. (a) State and, where appropriate, local agencies must operate a minimum number of required SO2 monitoring sites as described below.

4.4.2 Requirement for Monitoring by the Population Weighted Emissions Index. (a) The population weighted emissions index (PWEI) shall be calculated by States for each core based statistical area (CBSA) they contain or share with another State or States for use in the implementation of or adjustment to the SO2 monitoring network. The PWEI shall be calculated by multiplying the population of each CBSA, using the most current census data or estimates, and the total amount of SO2 in tons per year emitted within the CBSA area, using an aggregate of the most recent county level emissions data available in the National Emissions Inventory for each county in each CBSA. The resulting product shall be divided by one million, providing a PWEI value, the units of which are million persons-tons per year. 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.

(1) The SO2 monitoring site(s) required as a result of the calculated PWEI in each CBSA shall satisfy minimum monitoring requirements if the monitor is sited within the boundaries of the parent CBSA and is one of the following site types (as defined in section 1.1.1 of this appendix): population exposure, highest concentration, source impacts, general background, or regional transport. SO2 monitors at NCore stations may satisfy minimum monitoring requirements if that monitor is located within a CBSA with minimally required monitors under this part. Any monitor that is sited outside of a CBSA with minimum monitoring requirements to assess the highest concentration resulting from the impact of significant sources or source categories existing within that CBSA shall be allowed to count towards minimum monitoring requirements for that CBSA.

Table 5: TDEC DAPC Interpretation of the PWEI SO_2 Monitoring Requirements

CBSA AREA NAME	POP ESTIMATE 2019	2014 NEI		2017 NEI		
		PWEI 2017	PWEI 2018	2017 SO_2 NEI Tons*	PWEI 2019	SO_2 Monitors Required
Chattanooga, TN-Ga	565194	144	147	141	80	0
Clarksville, TN-KY	307820	162	166	768	236	0
Cleveland, TN	124942	18	19	52	6	0
Jackson, TN	178644	25	25	194	35	0
Johnson City, TN	203649	20	20	46	9	0
Kingsport-Bristol-Bristol, TN-VA	307202	6797	6796	13129	4033	0
Knoxville, TN	869046	4145	4175	3274	2846	0
Memphis, TN-MS-AR	1346045	19207	19240	8957	12056	1
Morristown, TN	142749	5	5	27	4	0
Nashville-Davidson-Murfreesboro-Franklin, TN	1934317	39927	40513	4114	7958	1

*NEI data not including mobile sources of SO2

4.4.3 *Regional Administrator Required Monitoring.* (a) The Regional Administrator may require additional SO_2 monitoring stations above the minimum number of monitors required in 4.4.2 of this part, where the minimum monitoring requirements are not sufficient to meet monitoring objectives. The Regional Administrator may require, at his/her discretion, additional monitors in situations where an area has the potential to have concentrations that may violate or contribute to the violation of the NAAQS, in areas impacted by sources which are not conducive to modeling, or in locations with susceptible and vulnerable populations, which are not

monitored under the minimum monitoring provisions described above. The Regional Administrator and the responsible State or local air monitoring agency shall work together to design and/or maintain the most appropriate SO_2 network to provide sufficient data to meet monitoring objectives.

4.4.5 *NCore Monitoring.* (a) SO_2 measurements are included within the NCore multipollutant site requirements as described in paragraph (3)(b) of this appendix. NCore-based SO_2 measurements are primarily used to characterize SO_2 trends and assist in understanding SO_2 transport across representative areas in urban or rural locations and are also used for comparison with the SO_2 NAAQS. SO_2 monitors at NCore sites that exist in CBSAs with minimum monitoring requirements per section 4.4.2 above shall be allowed to count towards those minimum monitoring requirements.

Lead Monitoring Network Requirements

40 CFR 58 Subpart G, Appendix D to Part 58 revised on December 30, 2016

4.5 *Lead (Pb) Design Criteria.* (a) State and, where appropriate, local agencies are required to conduct ambient air Pb monitoring near Pb sources which are expected to or have been shown to contribute to a maximum Pb concentration in ambient air in excess of the NAAQS, taking into account the logistics and potential for population exposure. At a minimum, there must be one source-oriented SLAMS site located to measure the maximum Pb concentration in ambient air resulting from each non-airport Pb source which emits 0.50 or more tons per year and from each airport which emits 1.0 or more tons per year based on either the most recent National Emission Inventory (*http://www.epa.gov/ttn/chief/eiinformation.html*) or other scientifically justifiable methods and data (such as improved emissions factors or site-specific data) taking into account logistics and the potential for population exposure.

(i) One monitor may be used to meet the requirement in paragraph 4.5(a) for all sources involved when the location of the maximum Pb concentration due to one Pb source is expected to also be impacted by Pb emissions from a nearby source (or multiple sources). This monitor must be sited, taking into account logistics and the potential for population exposure, where the Pb concentration from all sources combined is expected to be at its maximum.

(ii) The Regional Administrator may waive the requirement in paragraph 4.5(a) for monitoring near Pb sources if the State or, where appropriate, local agency can demonstrate the Pb source will not contribute to a maximum Pb concentration in ambient air in excess of 50 percent of the NAAQS (based on historical monitoring data, modeling, or other means). The waiver must be renewed once every 5 years as part of the network assessment required under §58.10(d).

(iii) State and, where appropriate, local agencies are required to conduct ambient air Pb monitoring near each of the airports listed in Table D-3A for a period of 12 consecutive months commencing no later than December 27, 2011. Monitors shall be sited to measure the maximum Pb concentration in ambient air, taking into account logistics and the potential for population exposure, and shall use an approved Pb-TSP Federal Reference Method or Federal Equivalent Method. Any monitor that exceeds 50 percent of the Pb NAAQS on a rolling 3-month average (as determined according to 40 CFR part 50, Appendix R) shall become a required monitor under paragraph 4.5(c) of this Appendix, and shall continue to monitor for Pb unless a waiver is granted allowing it to stop operating as allowed by the provisions in paragraph 4.5(a)(ii) of this appendix. Data collected shall be submitted to the Air Quality System database according to the requirements of 40 CFR part 58.16.

$PM_{2.5}$ Monitoring Network Requirements

40 CFR 58 Subpart G, Appendix D to Part 58 revised on December 30, 2016

4.7.1 General Requirements. (a) State, and where applicable local, agencies must operate the minimum number of required $PM_{2.5}$ SLAMS sites listed in Table D-5 of this appendix. The NCore sites are expected to complement the $PM_{2.5}$ data collection that takes place at non-NCore SLAMS sites, and both types of sites can be used to meet the minimum $PM_{2.5}$ network requirements. Deviations from these $PM_{2.5}$ monitoring requirements must be approved by the EPA Regional Administrator.

Table D-5 of Appendix D to Part 58—$PM_{2.5}$ Minimum Monitoring Requirements

MSA population[1] [2]	**Most recent 3-year design value ≥85% of any** $PM_{2.5}$ **NAAQS[3]**	**Most recent 3-year design value <85% of any $PM_{2.5}$ NAAQS[3] [4]**
>1,000,000	3	2
500,000-1,000,000	2	1
50,000-<500,000[5]	1	0

[1]Minimum monitoring requirements apply to the metropolitan statistical area (MSA).

[2]Population based on latest available census figures.

[3]The $PM_{2.5}$ National Ambient Air Quality Standards (NAAQS) levels and forms are defined in 40 CFR part 50.

[4]These minimum monitoring requirements apply in the absence of a design value.

[5]Metropolitan statistical areas (MSA) must contain an urbanized area of 50,000 or more population.

(b) Specific Design Criteria for $PM_{2.5}$. The required monitoring stations or sites must be sited to represent area-wide air quality. These sites can include sites collocated at PAMS. These monitoring stations will typically be at neighborhood or urban-scale; however, micro-or middle-scale $PM_{2.5}$ monitoring sites that represent many such locations throughout a metropolitan area are considered to represent area-wide air quality.

(1) At least one monitoring station is to be sited at neighborhood or larger scale in an area of expected maximum concentration.

(2) For CBSAs with a population of 1,000,000 or more persons, at least one $PM_{2.5}$ monitor is to be collocated at a near-road NO_2 station required in section 4.3.2(a) of this appendix.

(3) For areas with additional required SLAMS, a monitoring station is to be sited in an area of poor air quality.

(4) Additional technical guidance for siting $PM_{2.5}$ monitors are provided in references 6 and 7 of this appendix.

(c) The most important spatial scale to effectively characterize the emissions of particulate matter from both mobile and stationary sources is the neighborhood scale for $PM_{2.5}$. For purposes of establishing monitoring sites to represent large homogenous areas other than the above scales of representativeness and to characterize regional transport, urban or regional scale sites would also be needed. Most $PM_{2.5}$ monitoring in urban areas should be representative of a neighborhood scale.

(1) *Micro-scale.* This scale would typify areas such as downtown street canyons and traffic corridors where the general public would be exposed to maximum concentrations from mobile sources. In some circumstances, the

micro-scale is appropriate for particulate sites. SLAMS sites measured at the micro-scale level should, however, be limited to urban sites that are representative of long-term human exposure and of many such microenvironments in the area. In general, micro-scale particulate matter sites should be located near inhabited buildings or locations where the general public can be expected to be exposed to the concentration measured. Emissions from stationary sources such as primary and secondary smelters, power plants, and other large industrial processes may, under certain plume conditions, likewise result in high ground level concentrations at the micro-scale. In the latter case, the micro-scale would represent an area impacted by the plume with dimensions extending up to approximately 100 meters. Data collected at micro-scale sites provide information for evaluating and developing hot spot control measures.

(2) *Middle scale*—People moving through downtown areas, or living near major roadways, encounter particle concentrations that would be adequately characterized by this spatial scale. Thus, measurements of this type would be appropriate for the evaluation of possible short-term exposure public health effects of particulate matter pollution. In many situations, monitoring sites that are representative of microscale or middle-scale impacts are not unique and are representative of many similar situations. This can occur along traffic corridors or other locations in a residential district. In this case, one location is representative of a number of small-scale sites and is appropriate for evaluation of long-term or chronic effects. This scale also includes the characteristic concentrations for other areas with dimensions of a few hundred meters such as the parking lot and feeder streets associated with shopping centers, stadia, and office buildings.

(3) *Neighborhood scale*—Measurements in this category would represent conditions throughout some reasonably homogeneous urban sub-region with dimensions of a few kilometers and of generally more regular shape than the middle scale. Homogeneity refers to the particulate matter concentrations, as well as the land use and land surface characteristics. Much of the $PM_{2.5}$ exposures are expected to be associated with this scale of measurement. In some cases, a location carefully chosen to provide neighborhood scale data would represent the immediate neighborhood as well as neighborhoods of the same type in other parts of the city. $PM_{2.5}$ sites of this kind provide good information about trends and compliance with standards because they often represent conditions in areas where people commonly live and work for periods comparable to those specified in the NAAQS. In general, most $PM_{2.5}$ monitoring in urban areas should have this scale.

(4) *Urban scale*—This class of measurement would be used to characterize the particulate matter concentration over an entire metropolitan or rural area ranging in size from 4 to 50 kilometers. Such measurements would be useful for assessing trends in area-wide air quality, and hence, the effectiveness of large-scale air pollution control strategies. Community-oriented $PM_{2.5}$ sites may have this scale.

(5) *Regional scale*—These measurements would characterize conditions over areas with dimensions of as much as hundreds of kilometers. As noted earlier, using representative conditions for an area implies some degree of homogeneity in that area. For this reason, regional scale measurements would be most applicable to sparsely populated areas. Data characteristics of this scale would provide information about larger scale processes of particulate matter emissions, losses and transport. $PM_{2.5}$ transport contributes to elevated particulate concentrations and may affect multiple urban and State entities with large populations such as in the eastern United States. Development of effective pollution control strategies requires an understanding at regional geographical scales of the emission sources and atmospheric processes that are responsible for elevated $PM_{2.5}$ levels and may also be associated with elevated O_3 and regional haze.

4.7.2 Requirement for Continuous $PM_{2.5}$ Monitoring. The State, or where appropriate, local agencies must operate continuous $PM_{2.5}$ analyzers equal to at least one-half (round up) the minimum required sites listed in Table D-5 of this appendix. At least one required continuous analyzer in each MSA must be collocated with one of the required FRM/FEM/ARM monitors, unless at least one of the required FRM/FEM/ARM monitors is itself a continuous FEM or ARM monitor in which case no collocation requirement applies. State and local air monitoring agencies must use methodologies and quality assurance/quality control (QA/QC) procedures approved by the EPA Regional Administrator for these required continuous analyzers.

4.7.3 Requirement for $PM_{2.5}$ Background and Transport Sites. Each State shall install and operate at least one $PM_{2.5}$ site to monitor for regional background and at least one $PM_{2.5}$ site to monitor regional transport. These monitoring sites may be at community-oriented sites and this requirement may be satisfied by a corresponding monitor in an area having similar air quality in another State. State and local air monitoring agencies must use methodologies and QA/QC procedures approved by the EPA Regional Administrator for these sites. Methods used at these sites may include non-federal reference method samplers such as IMPROVE or continuous $PM_{2.5}$ monitors.

4.7.4 $PM_{2.5}$ Chemical Speciation Site Requirements. Each State shall continue to conduct chemical speciation monitoring and analyses at sites designated to be part of the $PM_{2.5}$ Speciation Trends Network (STN). The selection and modification of these STN sites must be approved by the Administrator. The $PM_{2.5}$ chemical speciation urban trends sites shall include analysis for elements, selected anions and cations, and carbon. Samples must be collected using the monitoring methods and the sampling schedules approved by the Administrator. Chemical speciation is encouraged at additional sites where the chemically resolved data would be useful in developing State implementation plans and supporting atmospheric or health effects related studies.

PM_{10} Monitoring Network Requirements

4.6 Particulate Matter (PM_{10}) Design Criteria.>(a) Table D-4 indicates the approximate number of permanent stations required in MSAs to characterize national and regional PM_{10} air quality trends and geographical patterns. The number of PM_{10} stations in areas where MSA populations exceed 1,000,000 must be in the range from 2 to 10 stations, while in low population urban areas, no more than two stations are required. A range of monitoring stations is specified in Table D-4 because sources of pollutants and local control efforts can vary from one part of the country to another and therefore, some flexibility is allowed in selecting the actual number of stations in any one locale. Modifications from these PM_{10} monitoring requirements must be approved by the Regional Administrator.

TABLE D-4 OF APPENDIX D TO PART 58 - PM 10 MINIMUM MONITORING REQUIREMENTS (APPROXIMATE NUMBER OF STATIONS PER MSA) 1

Population category	High concentration [2]	Medium concentration [3]	Low concentration [4 5]
>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

1 Selection of urban areas and actual numbers of stations per area will be jointly determined by EPA and the State agency.

2 High concentration areas are those for which ambient PM_{10} data show ambient concentrations exceeding the PM 10 NAAQS by 20 percent or more.

3 Medium concentration areas are those for which ambient PM_{10} data show ambient concentrations exceeding 80 percent of the PM 10 NAAQS.

4 Low concentration areas are those for which ambient PM_{10} data show ambient concentrations less than 80 percent of the PM 10 NAAQS.

5 These minimum monitoring requirements apply in the absence of a design value.

Index reporting requirements

40 CFR 58 Subpart G, 58.50 Revised as of October 26, 2015.

58.50 Index reporting.

(a) The state or where applicable, local agency shall report to the general public on a daily basis through prominent notice an air quality index that complies with the requirements of Appendix G: Annual Site Evaluations to this part.

(b) Reporting is required for all individual MSA with a population exceeding 350,000.

(c) The population of a MSA for purposes of index reporting is the most recent decennial U.S. census population.

NCore Monitoring Network Requirements and PM $_{10\text{-}2.5}$

40 CFR 58 Subpart G, Appendix D to Part 58 Revised as of December 30, 2016

(a) Each State (i.e. the fifty States, District of Columbia, Puerto Rico, and the Virgin Islands) is required to operate at least one NCore site. States may delegate this requirement to a local agency. States with many MSAs often also have multiple air sheds with unique characteristics and, often, elevated air pollution. These States include, at a minimum, California, Florida, Illinois, Michigan, New York, North Carolina, Ohio, Pennsylvania, and Texas. These States are required to identify one to two additional NCore sites in order to account for their unique situations. These additional sites shall be located to avoid proximity to large emission sources. Any State or local agency can propose additional candidate NCore sites or modifications to these requirements for approval by the Administrator. The NCore locations should be leveraged with other multipollutant air monitoring sites including PAMS sites, National Air Toxics Trends Stations (NATTS) sites, CASTNET sites, and STN sites. Site leveraging includes using the same monitoring platform and equipment to meet the objectives of the variety of programs where possible and advantageous.

(b) The NCore sites must measure, at a minimum, $PM_{2.5}$ particle mass using continuous and integrated/filter-based samplers, speciated $PM_{2.5}$, $PM_{10\text{-}2.5}$ particle mass, O_3, SO_2, CO, NO/NO_y, wind speed, wind direction, relative humidity, and ambient temperature.

(1) Although the measurement of reactive nitrogen compounds (NO_y) is required in support of several monitoring objectives, available commercial instruments may indicate little difference in their measurement of NO_y compared to the conventional measurement of nitrogen oxides (NO_x), particularly in areas with relatively fresh sources of nitrogen emissions. Therefore, in areas with negligible expected difference between NO_y and NO_x measured concentrations, the Administrator may allow for waivers that permit NO_X monitoring to be substituted for the required NO_y monitoring at applicable NCore sites.

(2) The EPA recognizes that, in some cases, the physical location of the NCore site may not be suitable for representative meteorological measurements due to the site's physical surroundings. It is also possible that

nearby meteorological measurements may be able to fulfill this data need. In these cases, the requirement for meteorological monitoring can be waived by the Administrator.

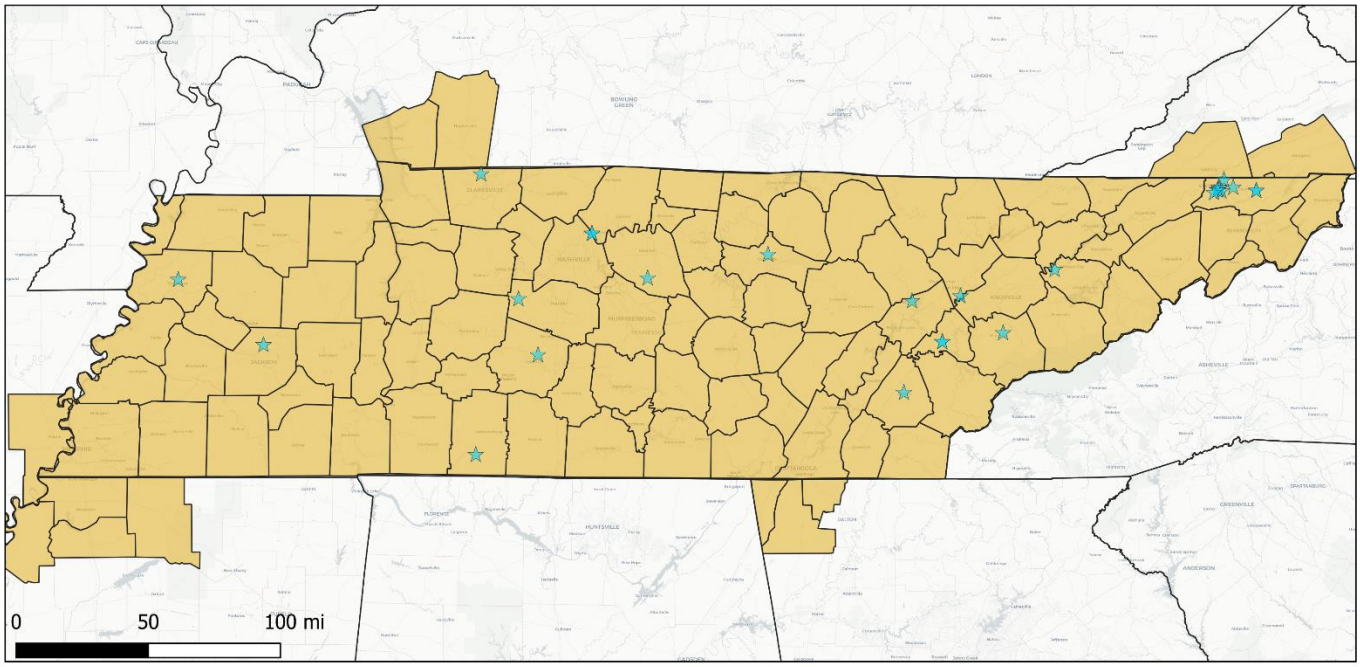
40 CFR 58 Subpart G, Appendix D to Part 58 revised as of December 30, 2016

Coarse Particulate Matter ($PM_{10-2.5}$) Design Criteria.

4.8.1 General Monitoring Requirements. (a) The only required monitors for $PM_{10-2.5}$ are those required at NCore Stations.
(b) Although microscale monitoring may be appropriate in some circumstances, middle and neighborhood scale measurements are the most important station classifications for $PM_{10-2.5}$ to assess the variation in coarse particle concentrations that would be expected across populated areas that are in proximity to large emissions sources.

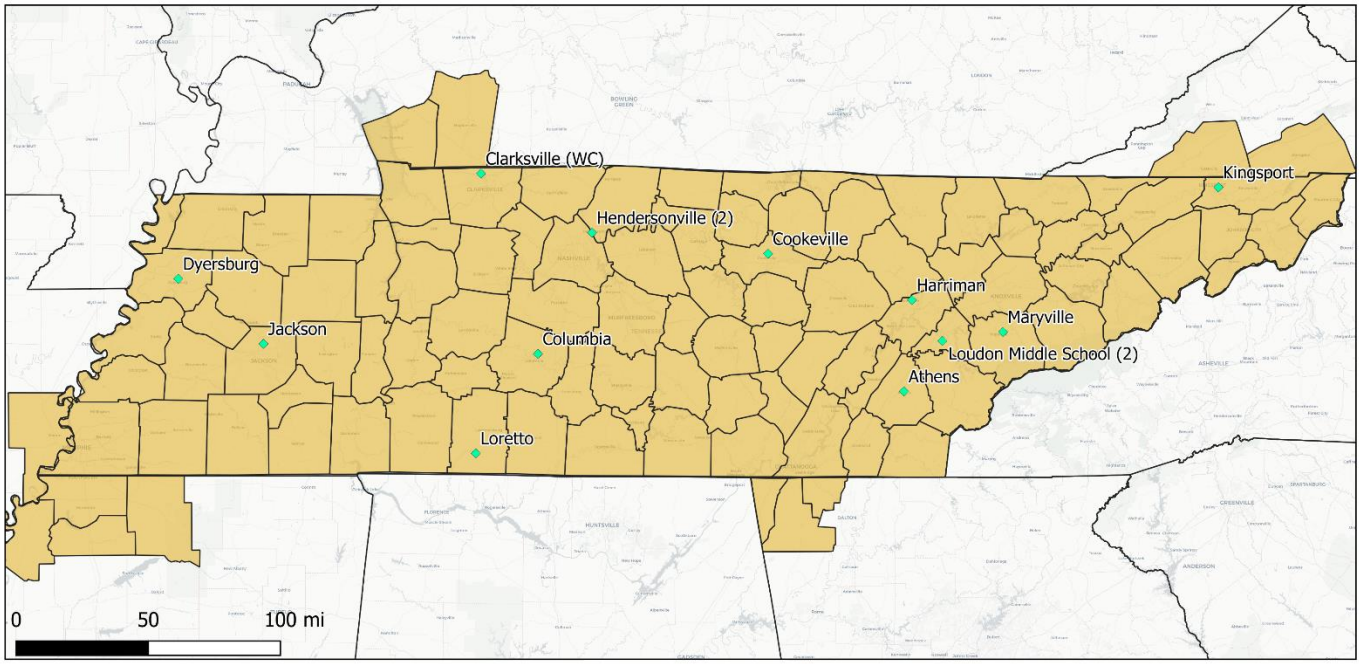
Appendix E TDEC DAPC Monitor Maps

All Monitoring Sites Operated by TDEC DAPC and the National Park Service



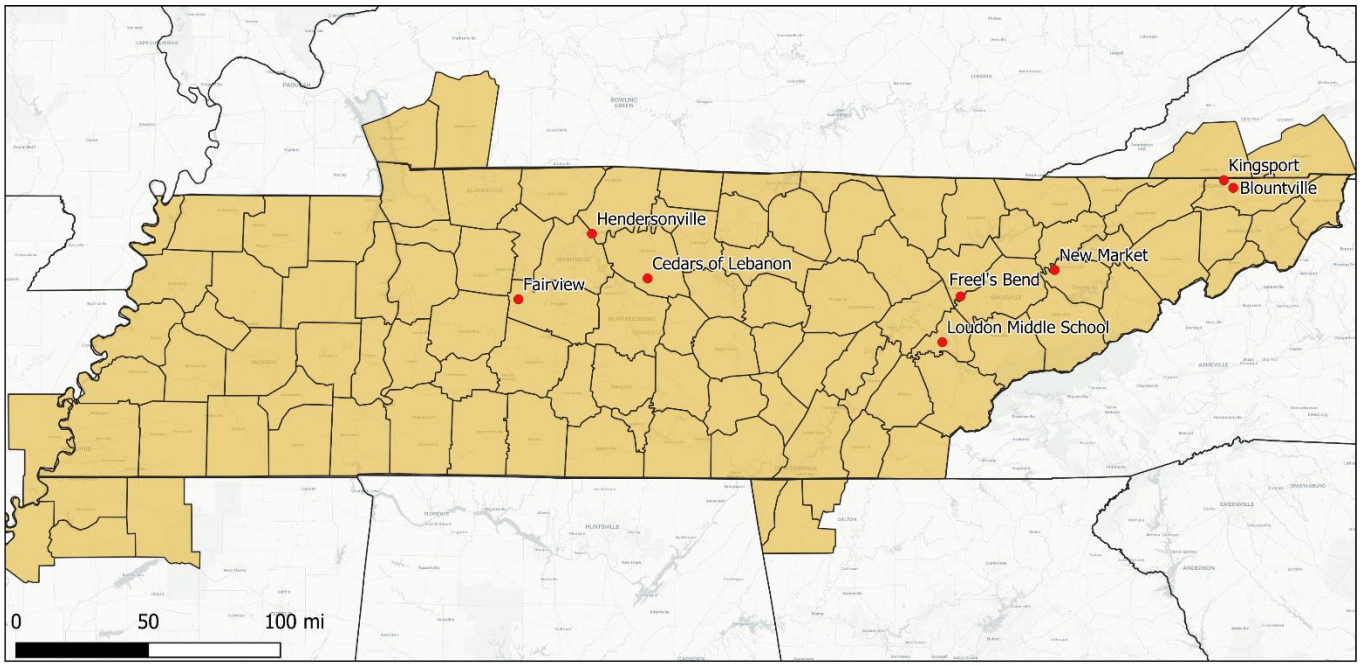
TDEC Monitor

$PM_{2.5}$ Monitor Locations



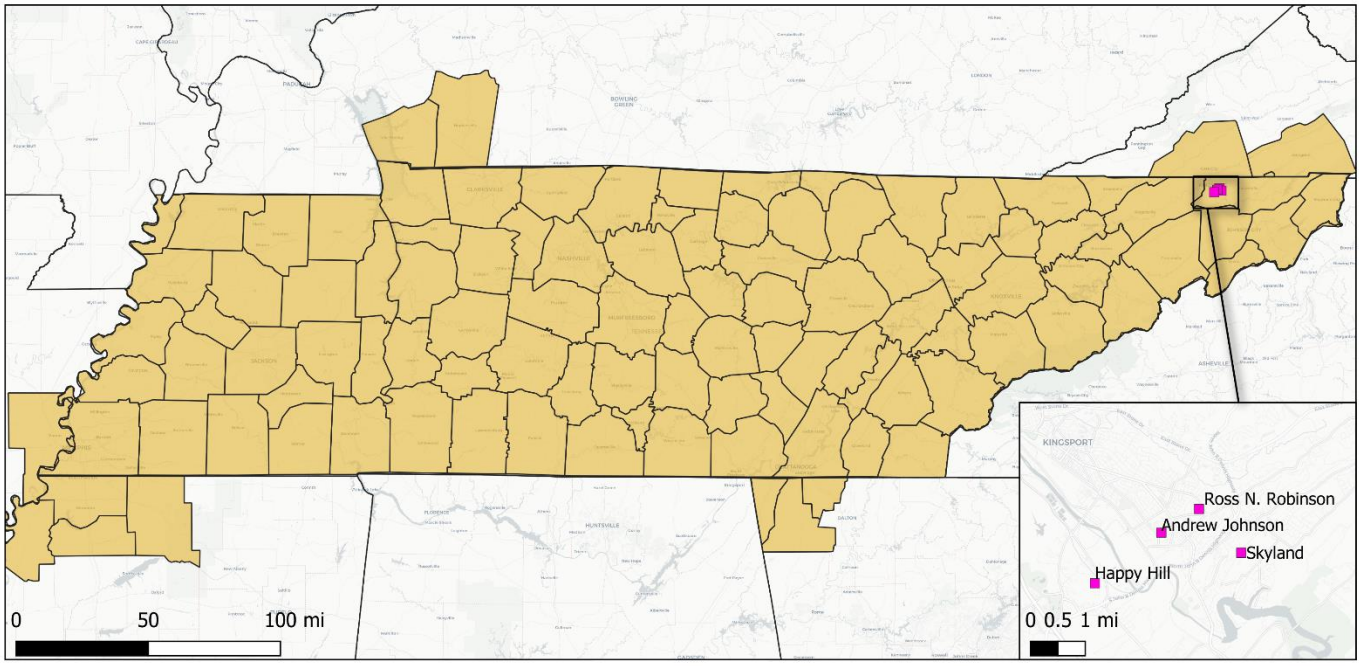
PM2.5 Monitors

Ozone Monitor Locations



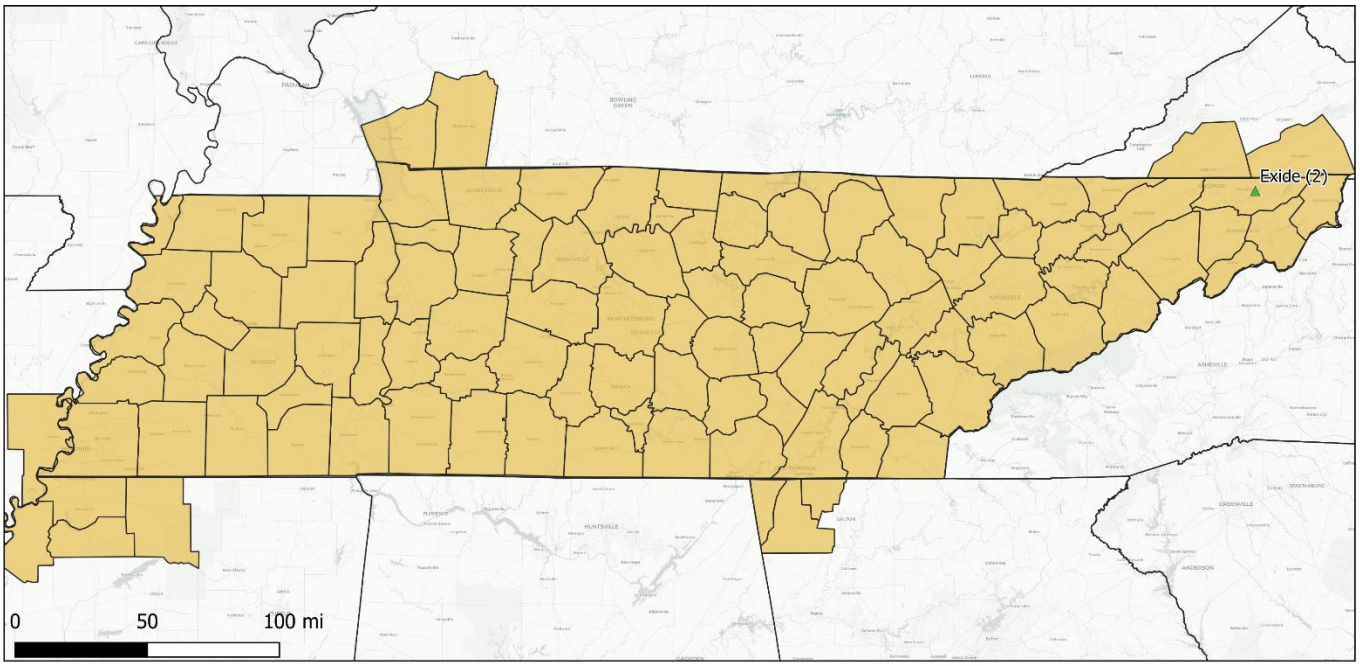
Ozone Monitors

SO_2 Monitor Locations



SO2 Monitors

Lead Monitor Locations



▲ Lead Monitors

Appendix F 2020 Annual Ongoing Data Requirements Report

Data Requirements Rule for the 2010 1-Hour Sulfur Dioxide National Ambient Air Quality Standard

Purpose and Background

The Tennessee Department of Environment and Conservation Division of Air Pollution Control (TDEC DAPC) has prepared this report as the state's Annual Ongoing Data Requirements Report for the 2010 1-Hour Sulfur Dioxide (SO_2) Primary National Ambient Air Quality Standard (NAAQS) as an appendix to its Annual Monitoring Network Plan. This report is intended to fulfill the annual reporting requirements of 40 CFR Part 51 Subpart BB, "*Data Requirements Rule for Characterizing Air Quality for the Primary SO_2 NAAQS*". The Annual Ongoing Data Requirements Report is due to the EPA on July 1, 2020, to meet the reporting requirements in 40 CFR 51.1205 (b)[1]

> "(b) *Modeled areas*. For any area where modeling of actual SO_2 emissions serve as the basis for designating such area as attainment for the 2010 SO_2 NAAQS, the air agency shall submit an annual report to the Environmental Protection Agency (EPA) Regional Administrator by July 1 of each year, either as a stand-alone document made available for public inspection, or as an appendix to its Annual Monitoring Network Plan (also due on July 1 each year under 40 CFR 58.10), that documents the annual SO_2 emissions of each applicable source in each such area and provides an assessment of the cause of any emissions increase from the previous year. The first report for each such area is due by July 1 of the calendar year after the effective date of the area's initial designation."

In Tennessee, the following counties shown in Table 1 are the areas subject to the Annual Ongoing Data Requirements Report. The listed Tennessee Valley Authority (TVA) facilities are the sources that required 2012-2014 modeling within these areas.

Table 1: TN DRR Areas and 2012-2014 Modeled Sources

County	Facility[2]	Maximum 1-hour SO_2 Impact[3]		Impact Distance
		µg/m3	ppb	km
Stewart	TVA - Cumberland Fossil Plant	121.8	46.5	3.19 (SW)
Humphreys	TVA - Johnsonville Fossil Plant	127.6	48.7	2.08 (E)
Shelby	TVA -Allen Fossil Plant	172.9	66.0	1.44 (N)

[1] 80 FR 51052, DRR for the 2010 1-Hour Sulfur Dioxide (SO_2) Primary NAAQS, August 21, 2015.

[2] The modeling packages for these facilities were originally submitted to EPA Region 4 on the following dates and were submitted again on November 10, 2016, to EPA Region 4:

TVA - Cumberland Fossil (CUF) Plant: September 21, 2016.

TVA - Johnsonville Fossil (JOF) Plant: October 12, 2016.

TVA - Allen Fossil (ALF) Plant: November 2, 2016.

[3] Maximum impacts are based on actual emissions for the affected units and permitted allowable emissions for the nearby sources, if any included.

Technical Analysis

On January 13, 2017[4], TDEC DAPC submitted a letter to Environmental Protection Agency (EPA) requesting that Humphreys, Shelby and Stewart Counties, Tennessee be designated as attainment/unclassifiable for the 2010 SO_2 NAAQS based on TDEC DAPC's analysis, performed in accordance with EPA's technical assessment guidance, regarding the air quality surrounding the TVA plants and the rest of these counties. The air quality analyses were based on modeling of actual SO_2 emissions (2012-2014) from sources in and around these counties. On January 9, 2018, U.S. EPA designated these three counties as attainment/unclassifiable[5] for the 2010 SO_2 NAAQS. Therefore, these areas are subject to the ongoing verification requirements under 40 CFR 51.1205(b), and the TDEC APC is submitting this Annual Ongoing Data Requirements Report to meet the reporting requirements for these modeled areas.

Per 40 CFR 51.1205 (b), TDEC DAPC is required to document the annual SO_2 emissions of each applicable source in the *modeled areas*. Table 2 lists the TVA Power Stations within these *modeled areas* and details their annual actual SO_2 emissions in tons from 2012 to 2019. The air program acquired all the emission data from the Tennessee Emissions Inventory Program and confirmed the emission data matched the one in EPA's Clean Air Market Division (CAMD) Acid Rain Program (ARP) database.

Table 2. Annual Actual SO_2 Emissions in Stewart, Humphreys and Shelby Counties for TVA DRR Sources

Area	Modeled Source (Facility ID)	TVA Actual SO2 Emissions from TnEIP (tons/year)							
		2012	2013	2014	2015	2016	2017	2018	2019
Stewart County	TVA - Cumberland Fossil Plant (81-0011)	10,101	7,962	9,396	8,849	10,123	6,650	7,408	7,209
Humphreys County	TVA - Johnsonville Fossil Plant (43-0011)	17,812	12,072	17,518	29,631	9,202	6,330	22	13
Shelby County	TVA – Allen Fossil Plant (79-0528)	9,609	9,989	9,750	6,950	7,693	7,635	916	14

The actual modeled emissions for the DRR 2012-2014 modeling are shown in Table 3 for the three TVA Power Stations.

[4] This letter addresses revisions to the May 26, 2011, letter in revising Tennessee's sulfur dioxide designation recommendations for sources subject to the Data Requirements Rule for the 2010 SO_2 NAAQS.

[5] Federal /Register Notice Published January 9, 2018 [83 FR 1098, pages 1158-1159].

Table 3. Modeled 2012-2014 SO2 Emissions in Stewart, Humphreys and Shelby Counties for TVA DRR Sources

Area	Modeled Source (Facility ID)	TVA Actual SO2 Emissions (tons/year)			Max-Modeled Design Value (ppb)
		2012	**2013**	**2014**	**2012-2014**
Stewart County	TVA - Cumberland Fossil Plant (81-0011)	10,103	7,964	9,396	46.5
Humphreys County	TVA - Johnsonville Fossil Plant (43-0011)	11,644	9,747	17,568	48.7
Shelby County	TVA – Allen Fossil Plant (79-0528)	9,651	10,026	9,781	66.0

NOTE:

[a] SO2 Hourly NAAQS = 75 ppb.

[b] TVA Cumberland two boilers were modeled only, and no other nearby sources included.

[c] TVA Johnsonville modeled with (DuPont and Hood Containers nearby sources at allowable emission rates of 59.7 and 50.8 tpy respectively).

[d] TVA Allen was modeled with the nearby (Nucor Steel Memphis source at allowable emission rate of 201.5 tpy).

The total reduction in SO2 emissions for TVA DRR sources between the modeled 2012-2014 period and the latest 2017-2019 period are shown in table 4 for Stewart, Humphreys and Shelby Counties

Table 4. Total SO2 Emissions Reductions in Stewart, Humphreys and Shelby Counties for TVA DRR Sources.

Area	Modeled Source (Facility ID)	TVA Actual SO2 Emissions (tons/year)		Emissions Reductions (tons/year)
		2012-2014 Total (from Table 3)	2017-2019 Total (from Table 2)	
Stewart County	TVA - Cumberland Fossil Plant (81-0011)	27,463	21,267	-6,196
Humphreys County	TVA - Johnsonville Fossil Plant (43-0011)	38,959	6,365	-32,594
Shelby County	TVA – Allen Fossil Plant (79-0528)	29,458	8,565	-20,893

For **Stewart County**, table 2 shows that the 2019 annual emissions from TVA-Cumberland Power Station decreased from the 2018 emissions by nearly 200 tons per year (tpy) and are less than any of the years during the 3-year period that were included in the initial DRR modeling (i.e., 2012-2014) as shown in table 3. Additionally, there is a total SO2 emissions reduction of 6,196 tpy between the modeled 2012-2014 period and the latest 2017-2019 period as shown in table 4, therefore no additional modeling analysis is needed.

For **Humphreys County**, table 2 shows that the 2019 annual emissions from TVA-Johnsonville Power Station significantly decreased from the 2017 levels due to the retirement and shut down of the coal-fired boilers in 2018. Units five through ten at this plant were retired prior to 2017, and the remaining units one through four were retired by the end of 2017. The 2019 emissions are less than any of the 3-year period that were included in the initial DRR modeling (i.e., 2012-2014) as shown in table 3. Additionally, there is a total SO2 emissions reduction of 32,594 tpy between the modeled 2012-2014 period and the latest 2017-2019 period as shown in table 4, therefore no additional modeling analysis is needed.

For **Shelby County**, table 2 shows that the 2019 annual emissions from TVA-Allen Power Station are significantly less than the 2018 emissions due to the retirement and shut down of the three coal-fired boilers in the second quarter of 2018. The 2019 emissions are less than any of the 3-year period that were included in the initial DRR modeling (i.e., 2012-2014) as shown in table 3. Additionally, there is a total SO2 emissions reduction of 20,893 tpy between the modeled 2012-2014 period and the latest 2017-2019 period as shown in table 4, therefore no additional modeling analysis is needed.

Public Inspection Period

As required in 40 CFR 51.1205, TDEC APC has made this report as an appendix to its Annual Monitoring Network Plan.

Appendix G Annual Site Evaluations & Documentation

2020 Tennessee monitoring site evaluation documentation can be found at TDEC DAPC's Air Quality Monitoring & Forecasting website:

https://www.tn.gov/environment/program-areas/apc-air-pollution-control-home/apc/air-quality-forecasting.html