



CHATTANOOGA- HAMILTON COUNTY AIR POLLUTION CONTROL NETWORK REVIEW 2020

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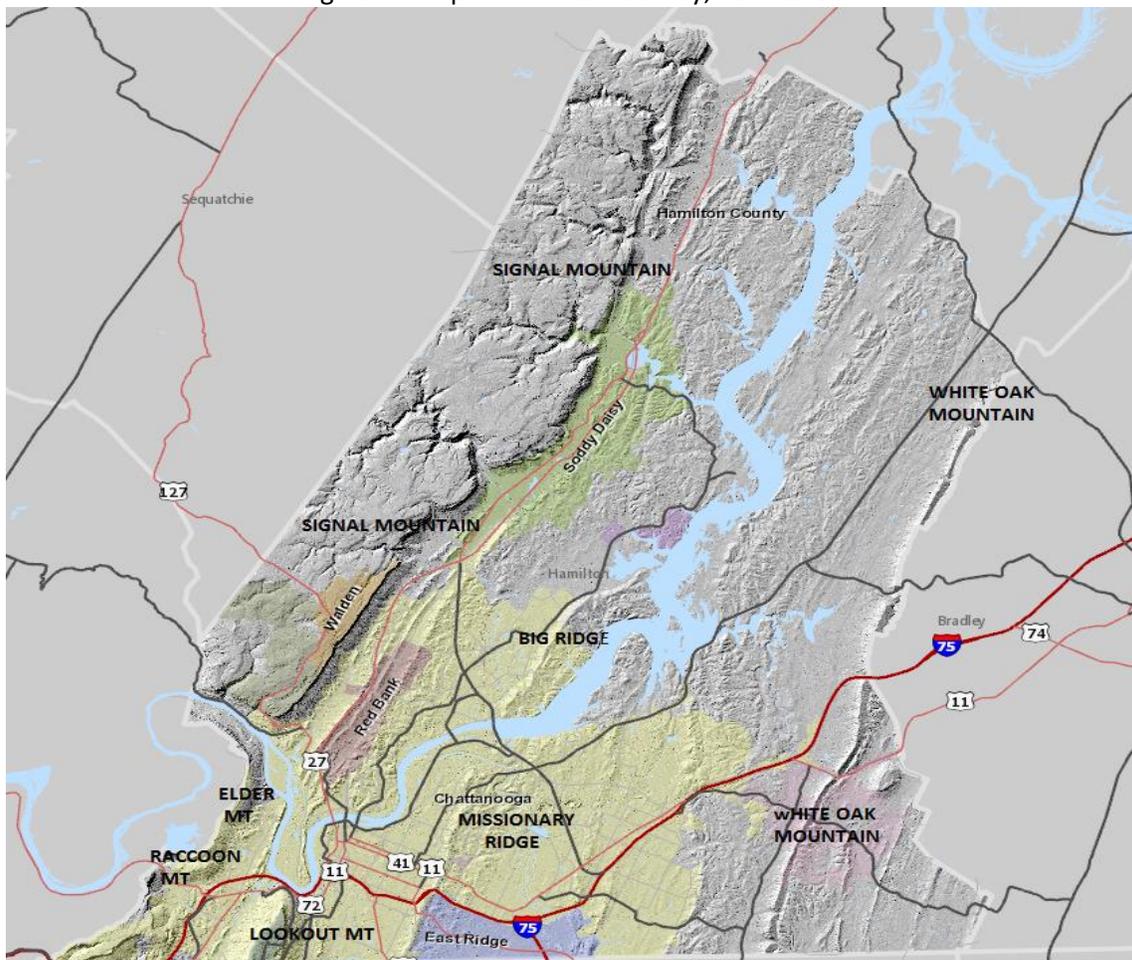
Introduction

Hamilton County, Tennessee, contains the City of Chattanooga and the municipalities of Soddy Daisy; Signal Mountain; Red Bank; East Ridge; Collegedale; Ridgeside; Walden; Lakesite; and Lookout Mountain, Tennessee, and the remaining unincorporated area of Hamilton County. It is on the Tennessee, Georgia, Alabama border which means that pollution reduction is a cooperative effort between states. Designation areas for both ozone and particulate contain counties from Tennessee and Georgia.

Geography

Hamilton County is a picturesque Tennessee River valley between White Oak Mountain on the east of the county and Mowbray, Signal, Elder, Raccoon, and Lookout Mountains on the West of the County. The county is divided vertically by Big Ridge and Missionary Ridge, part of the same ridge chain. The Tennessee River flows through the ridge horizontally (where the ridge name changes) and through downtown Chattanooga. The valley, therefore, is shaped similarly to an "A". The topography is a liability for pollution prevention and reduction as frequent temperature inversions trap smoke in the valley.

Figure 1- Map of Hamilton County, Tennessee



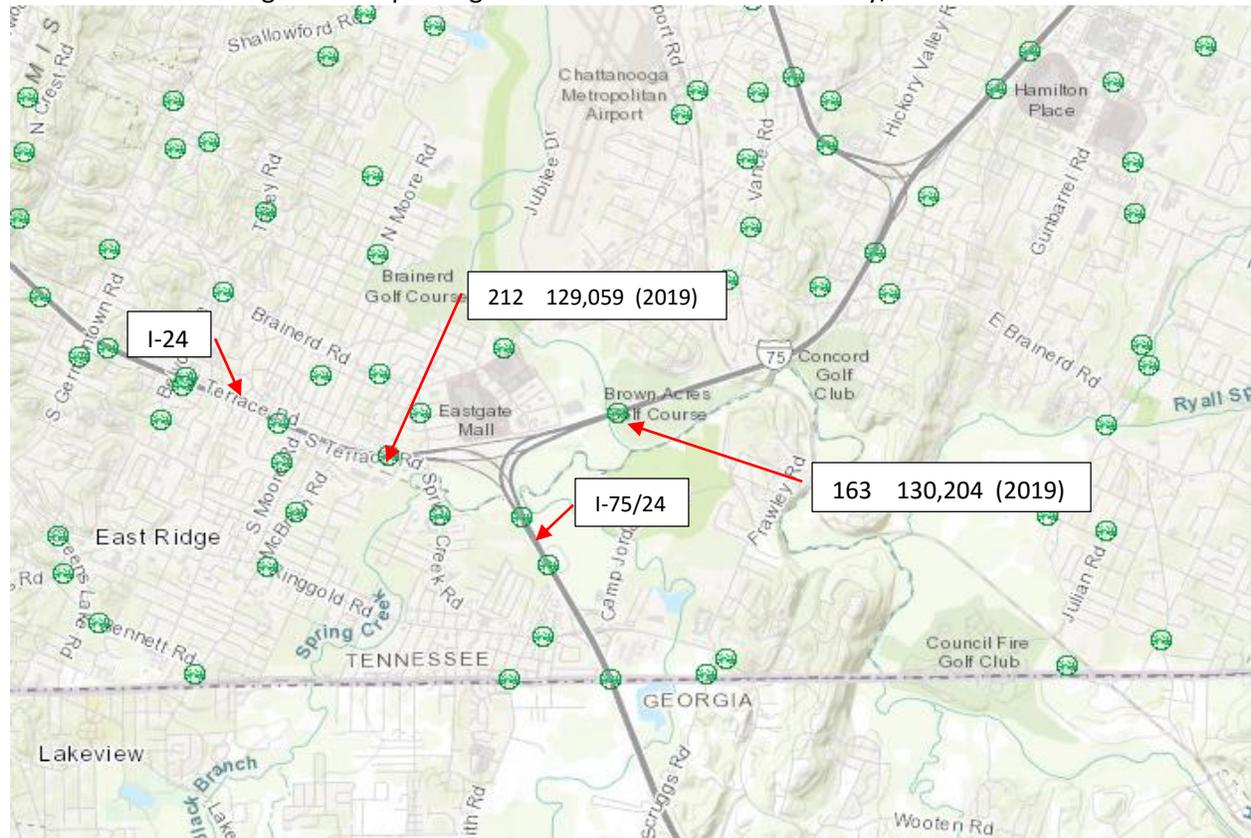
Downtown Chattanooga is about 680 feet above sea level. There were at least four floods of downtown Chattanooga in the late 1800s and early 1900s, the most devastating one in 1867. To attempt to remedy the flooding, downtown was filled in from 3 to 15 feet after 1917 or an average of about one story. The fill area started with four central downtown streets and eventually covered about 40 blocks. Begun in 1933, the Tennessee Valley Authority's system of dams and control of the waterways not only provided electricity to the masses, but it improved Chattanooga's flooding plight considerably.

Traffic Patterns

About 1988 the then largest mall in Tennessee, Hamilton Place, was built in East Brainerd accessible by I-75. This spurred commercial and residential growth around the mall. In one year vehicle miles traveled (VMT) per year increased from about 6 million VMT to over 10 million VMT. It has stayed in the 9.7 to 10.95 million range since. There has, however, been a steady increase since 2013.

The Interstate 75 corridor, a major north-south route for commercial transport, runs through Chattanooga and connects with I-24 near East Ridge. On either side of the I-75/I-24 split are the highest traffic counts in Hamilton County. The latest available posted numbers are 2019 indicating a daily average traffic count of 129,059 at #212 East Ridge Station which is just west of the I-75/I-24 split. The highest count in Hamilton County is on the east side of the split at #163 is 130,204. The major rework of the I-75/24 split by the state began in 2020. This project is designed to ease some of the traffic congestion as the split is a traffic bottleneck. Vehicle pollution in that area is expected to be reduced when the project is completed. The congestion will be problematic during the construction.

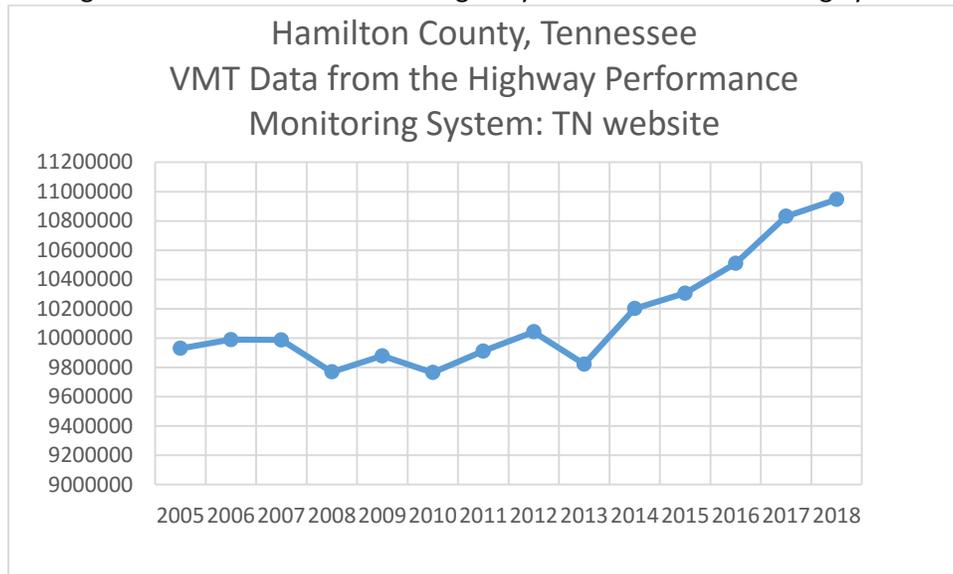
Figure 2- Map of High Traffic Area of Hamilton County, Tennessee



Vehicle Miles Traveled

The latest available data posted on TDOT’s website for VMT by county is 2018. The VMT has been increasing steadily since 2013.

Figure 3- Data from Tennessee Highway Performance Monitoring System



The year 2020 should decrease in VMT due to the shelter in place policy because of the Covid- 19 pandemic. Vehicle insurance companies rebated money to their customers because of the reduction in accidents during this time period. The reduction in traffic should make a significant contribution toward lowering ozone and particulate pollution for Hamilton County for 2020.

Population

The U.S. Census Bureau population estimate (from the website) for July 1, 2019, for Hamilton County is 367,804 and for 2018 (2019 not available) for the City of Chattanooga is 180,557.

The two areas of the highest population density in Hamilton County are in the municipality of East Ridge and downtown in the University of Tennessee at Chattanooga area. Both areas of the highest density contain particulate monitoring sites for PM_{2.5}. The University density is seasonal as the density decreases in the summer months. The population density of East Ridge is 2,534 persons per square mile (2010 census) whereas the City of Chattanooga has a population density of 1,223 (2010) persons per square mile. East Ridge, therefore, is more than twice as dense as the City of Chattanooga. The population density of Hamilton County is 620 (2010) persons per square mile.

The Hamilton County racial demographics for predominant ethnicities for 2018 (most current available from US Census Bureau) of Hamilton County (based on the Vintage 2018 Population Estimates Program) are White only (not Hispanic or Latino) 71.0%; Black only 19.4%; Asian only 2.1%; and Latino/Hispanic only 5.9%. The racial demographics of the City of Chattanooga (based on the 2018 American Community Survey- 5 year estimates) for predominant ethnicities are: White only (not Hispanic or Latino) 56.6%, Black only 32.6%, Asian only 2.4%, and Latino/Hispanic only 6.1%. The Census Bureau cautions against

comparisons of geographic area racial demographics because of the methodology differences in data sources.

The 2018 Small Area Income and Poverty Estimates (SAIPE) on the US Census Bureau website estimates the poverty in Hamilton County for 2018 as 13.0%. The poverty estimate for the City of Chattanooga is 18.8% based on the 2018 American Community Survey 5-year estimates. Neither estimation of poverty is comparable to other geographic level poverty estimates because of the methodology differences in data sources.

The Covid-19 pandemic in 2020 increased unemployment and poverty in both the City of Chattanooga and Hamilton County. Large industrial employers, retail stores, restaurants, and nail/hair salons were forced to shut down for the pandemic shelter in place. The temporary or permanent loss of employment affected the most vulnerable populations.

The Chattanooga-Hamilton County CBSA is composed of Hamilton, Marion, and Sequatchie counties in Tennessee and Catoosa, Dade, and Walker Counties in Georgia. The US Census Bureau’s 2019 population estimate for the CBSA is 565,194 with an estimated increase of 4,401 over the estimate for 2018. Hamilton County is the most urbanized county in the CBSA. The other counties are more rural.

Weather

Hamilton County tends to have frequent temperature inversions.

Figure 4- Thirty Year Averages
National Weather Service website
(‘Normals’ are thirty year averages based on the period 1981-2010)

Chattanooga Annual Averages	
Precipitation.....52.48 inches	Days with 0.01" or more of precipitation.....119.6
Snowfall.....3.9 inches	Days with 1.0" or more of snowfall.....1
Days with thunderstorms.....54.8	Days at or above 90 F.....47.7
Days with dense fog.....27.3	Days at or below 32 F.....58.3
Average first freeze.....November 4	Average last freeze.....April 1
Average first frost.....October 20	Average last frost.....April 14

Wind speed and direction are of interest in evaluating pollution, emissions, and transport. These wind roses were produced from data collected at the Chattanooga Metropolitan Airport at Lovell Field (Station 13882) using the Midwestern Regional Climate Center’s Application Tools Environment.

Figure 5- Ten Year Wind Rose for Jan 1, 2010- December 31, 2019

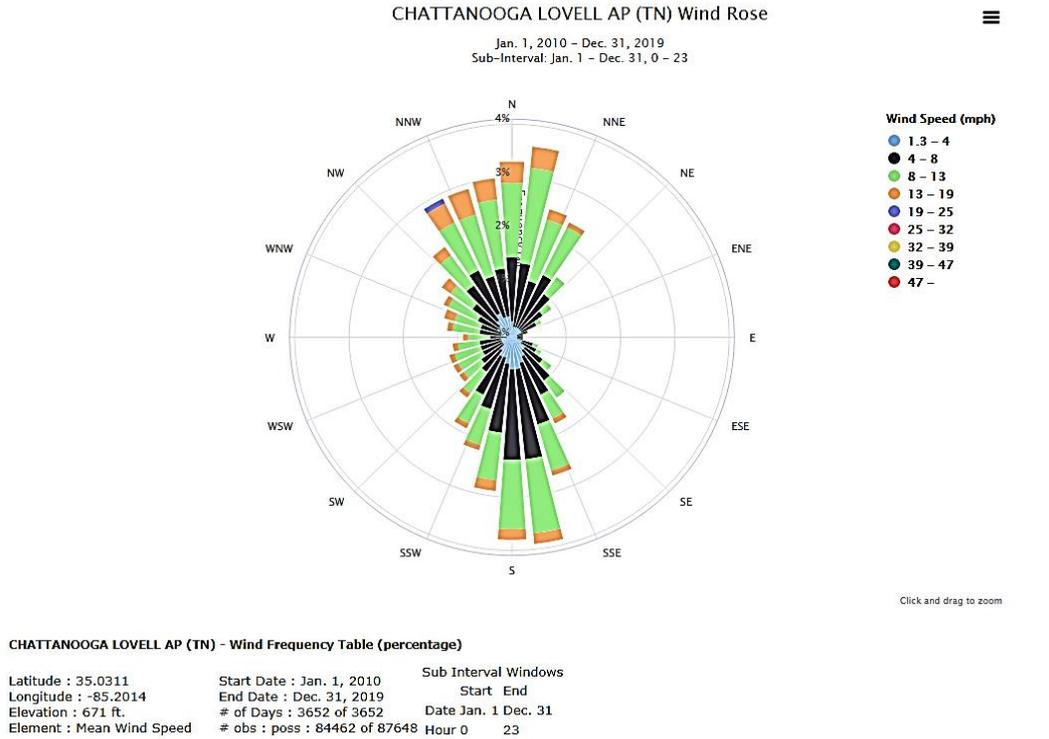
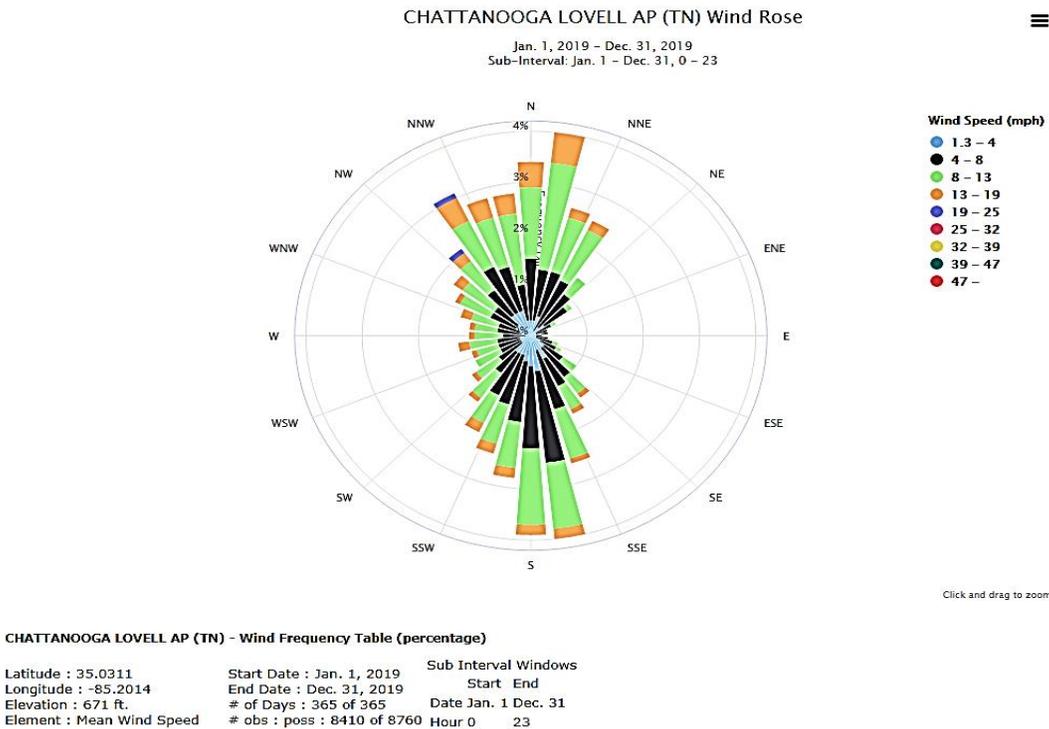


Figure 6- Wind Rose for 2019



Tornados

On Easter Sunday, April 11, 2020, seven tornados devastated areas of Hamilton County and counties nearby. Three tornados, beginning about 8:15 PM EDT, individually touched down in Walker County, Murray County, and Dade County in Georgia. Then a tornado touched down in Hamilton County. As the Hamilton County storm moved toward Bradley County, Tennessee, three more tornados developed in Bradley County.

According to the National Weather Service release published in the *Times Free Press* on April 18, 2020, the EF3 tornado that devastated Hamilton County was 1,500 yards wide and 14.5 miles long. The tornado traveled from southeast Chattanooga to Ooltewah. More than 1,000 buildings were damaged causing millions of dollars in destruction. A subdivision, Holly Hills, in East Brainerd was particularly devastated, and most of the 200 homes were damaged or destroyed.

The Bureau issued “tornado damage” burn permits to extend outdoor burning to June 15 with the special permit. Normally burn season ends April 30. The sites are inspected by the Bureau’s Inspector before the permit is issued. The City of Chattanooga is picking up brush where it can be moved to the road.

The residential neighborhood that was hardest hit, Holly Hills, is within 5 miles of the Bureau Eastside Utility ozone site. The Bureau will be monitoring the outdoor burning in relation to pollution levels. Although it is not anticipated that the burning will significantly affect pollution data because pollution levels have been quite low for several years, the Bureau has been in contact with EPA Region 4 in Atlanta about the tornado disaster event. The Bureau will apply for exceptional event status, if needed.

Network Review 2020

PM₁₀ Site Requirement Waiver

The Chattanooga-Hamilton County Air Pollution Control Bureau (the Bureau) petitioned EPA on August 28, 2014, to delete the collocated PM₁₀ site operating on a 6-day monitoring schedule at 3300 South Broad Street (470650006). High volume samplers were operated at the site. EPA approved the site deletion in the approval letter for the 2014 State Air Monitoring Plan dated January 13, 2015. The monitors were shut down after the January 12, 2015, run date. EPA considers the deletion of this site the granting of a waiver of 40 CFR requirements.

Data Comparison to the NAAQS

40 CFR Part 58 requires the Annual Monitoring Network Review to identify sites that are suitable and sites that are not suitable for comparison against the annual PM_{2.5} NAAQS. All four Chattanooga-Hamilton County monitoring sites produce data that are suitable to compare against the National Ambient Air Quality Standards. All sites meet siting requirements, and all required data are produced by Federal Equivalent or Federal Reference Methods. All sites' data meet data completion requirements and quality control requirements. Ozone and PM_{2.5} particulate data are meeting the NAAQS.

Purchase of T640 for PM_{2.5} AQI

The Bureau purchased a Teledyne T640 light scattering instrument in 2016 for continuous PM_{2.5} monitoring. It began operation in 2017 as a Special Purpose Monitor for PM_{2.5} until January 1, 2019, then it was made a SLAMS (retaining the POC 3). It monitors PM₁₀ data in addition to PM_{2.5}, but the PM₁₀ data is not Federal Equivalent. The 1400 AB TEOM has been decommissioned. It was removed from the site when the shelter was removed.

Figure 7- Active Sites

Chattanooga-Hamilton County Active Sites	Pollutant	Monitor	AQS #
911 Siskin Drive	<i>PM_{2.5} Collocated</i> (Primary-3-day, Secondary 12-day): TEI R & P FRM filter-based/ <i>PM_{2.5} Continuous</i> (FEM) and <i>PM₁₀</i> (not FEM): T640	(2) TEI R & P 2025i Seq. Teledyne T640 Continuous	470654002 CORE PM _{2.5}
1517 Tombras Avenue Behind East Ridge City Hall	<i>PM_{2.5}</i> (Daily collocation from 1/1/2009-1/17/2010) 3-day monitoring began 1/20/2010)	TEI R & P 2025 Seq.	470650031
618 Sequoyah Road Soddy-Daisy H.S.	Ozone Continuous Ozone Calibrator	TECO 49i (49C in use for 2020) TECO 49iPS	470651011
3018 Hickory Valley Road Eastside Utility District	Ozone Continuous Ozone Calibrator	TECO 49i TECO 49iPS	470654003

Figure 8- Equipment Evaluation 2020

Equipment	Location	Serial Number	Condition
PM ₁₀ -Stored	0006	1847- decommissioned 1/2015	Good
PM ₁₀ -Stored	0006	1845-decommissioned 1/2015	Good
PM _{2.5}	4002	20781 with VSCC	Parts only
PM _{2.5}	4002	20775 with VSCC	Good
PM _{2.5}	0031	20772 with VSCC	Good
PM _{2.5}	Spare	20774-decommissioned 12/31/2015	Good
PM _{2.5}	Spare	90709	Good
PM _{2.5} TEOM	Spare	1400A 24452: Eq Unit SES1B 203940211 Sensor Unit 140AB 244520302	Good
PM _{2.5} T640	4002	070600000:83	Excellent
Met One Speciation	4002	a5924/a5910-decommissioned 1/2015	Good
URG 3000	4002	3N-B0768- decommissioned 1/2015	Good
Ozone	1011	49i-143566748-installed 2/2015	Excellent
Ozone	4003	49i-143566747-installed 2/2015	Excellent
Ozone-Spare	1011	49C-58192-316	Good
Ozone-Spare	4003	49C-57404-313	Good
Ozone Calibrator-Spare	1011	49CPS-66337-352	Good
Ozone Calibrator-Spare	4003	49CPS-66338-352	Good
Ozone Calibrator	1011	49iPS- installed 2/2016	Excellent
Ozone Calibrator	4003	49iPS- installed 2/2016	Excellent
Data logger	1011	ESC 8816-1904	Good
Data logger	4003	ESC 8816-1905	Good
Data logger	Spare	ESC 8816-1906	Parts only
Data logger	4002	ESC 8832 AO994	Good
Data logger	1011	ESC 8832 A 4010 K	Good
Data logger	4003	ESC/Agilaire 8872 installed Aug 2017- 642	Excellent
Data logger	1011	ESC/Agilaire 8872: new April 2018: Installed in 2018, removed, and reinstalled for March 1, 2019- 799	Excellent
Ozone Audit Monitor	1011/4003	49i-0607415796	Good
Chart Recorder	1011	1001685- decommissioned 2/2017	Good
Chart Recorder	4003	1001686- decommissioned 2/2017	Good
Chart Recorder	Spare	Leeds/Northrup Speedomax 165 82-31986-1-1	Good
8 X 14 Shelter	1011	Shelter One 8148 SN21051-to be replaced	Good
8 X 14 Shelter	4003	EKTO 8814 SN 3473-1- to be replaced in 2020	Poor
PC with AV Trends	1011	Agilaire software/companion to Airvision	Excellent
PC with AV Trends	4003	Agilaire software/companion to Airvision	Excellent
UPS	1011	8872 needed UPS -installed 2018	Excellent
UPS	4003	8872 needed UPS-installed 2018	Excellent
Siskin Site deck	4002	Installed June 2018	Excellent

Changes to Established Sites

The Siskin Drive shelter at the 470654002 (downtown) site was removed because of its poor condition and was replaced with a platform in June of 2018. When the equipment was removed from the shelter to install on the deck, the TEOM was taken out of service. The new Teledyne T640 continuous PM_{2.5} monitor reports to AirNow for the Air Quality Index in place of the TEOM. The minishelter to the right in the photograph houses the T640. Behind the minishelter is a cabinet that houses the data logger.

Figure 9- New Deck for PM_{2.5} at 911 Siskin Drive.



The Bureau ordered a new shelter for the Eastside Utility site that is expected to be delivered in late summer 2020. The installation is currently anticipated to be completed between November 1, 2020, and February 1, 2021, during the period monitoring is not required. A second new shelter is to be ordered after July 1, 2020, for the Soddy Daisy Site. The anticipated installation is expected to be between November 1, 2020, and February 1, 2021.

The chart recorders at the ozone sites have been taken out of service entirely. In their place is an additional data logger at each site, spare Agilaire 8816s. Both the primary and secondary loggers are being polled. Both sites also have AV Trends software that captures data from the primary logger on a local PC. AV Trends enables the operator to view previously recorded data during a site visit. Data at the site can be manipulated into graphs using the software.

AV Trends is not currently being used at the two ozone sites for ozone season 2020. The City of Chattanooga has transitioned to Windows 10. The newest version of AV Trends is apparently not compatible with Windows 7 that is on the AV Trends computers. New computers with Windows 10 have been ordered for AV Trends.

The Bureau began using Very Sharp Cut Cyclones (VSCCs) for all PM_{2.5} FRMs on January 1, 2017. The Bureau is no longer using WINs Impactors.

Temporary Measure for Ozone Monitoring at Soddy Daisy Site

A flow sensor was ordered for the TEI 49i analyzer that is normally installed at the Soddy Daisy ozone site. The 2020 ozone season was started with a 49C instrument at Soddy Daisy that had been stored. The flow sensor order was delayed and has just now arrived at the Bureau (April 2020). The current plan is to leave the 49C in place for this ozone season.

Collocation Requirements

Hamilton County's collocation requirement is met by having two FRM PM_{2.5} monitors at the Siskin Drive site. The collocated FRM began operating on a 12-day schedule on May 9, 2019.

No Expected Site Changes for 2020

No appropriate nearby sites have been found to move the Eastside Utility site. Since the site is close to a fairly high crime area the added security from Eastside Utility has become more attractive.

Memorandum of Agreement with the State of Georgia

The Memorandum of Agreement with the State of Georgia was renewed in 2018. A copy is included in Appendix A.

SODDY DAISY HIGH SCHOOL



Rep Org Name	CHATTANOOGA HAMILTON COUNTY AIR POLLUTION CONTROL BUREAU	<p>The Soddy Daisy High School site is located in the municipality of Soddy-Daisy in North Hamilton County. The site was initially established as an ozone site August 1, 1978, at 9527 West Ridge Trail Road behind the Head Start Building using a chemiluminescence method. June 1, 1979, the method was changed to UV. The ozone site was moved February 1, 2002, within a mile radius, to a new shelter on a hill behind Soddy Daisy High School. The PM_{2.5} monitor was originally located on the roof of the Sheriff's Annex at 6233 Dayton Boulevard (AQS 470650032) as a Special Purpose Monitor (established 6/5/1999). The monitor was moved to the roof of the new shelter at 470651011 in mid-January 2002- first monitoring date was 1/26/02. In June 2008 the monitor was changed from a WINS Impactor to a Very Sharp Cut Cyclone model while retaining the same method code to designate it FRM. May 20, 2009, the shelter and monitors were moved approximately 100 feet east on the same property to accommodate the building of a girls' softball field. The Bureau shut down the PM_{2.5} SPM at the end of December 2015. The last run date was 12/27/2015. The site is active for ozone monitoring.</p>
PQAO	0170	
Address	SODDY DAISY HIGH SCHOOL 618 SEQUOYAH ACCESS ROAD	
AQS ID	470651011	
County Name	HAMILTON	
CBSA	CHATTANOOGA/ NORTH GEORGIA	
Lat	35.233562	
Lon	-85.181591	
Parameter Code	44201	
Parameter	OZONE	
Monitor Type	SLAMS	
POC	1	
Interval	1	
Year	2020	
Collection Freq.	HOURLY	
Method	047	
FRM/FEM	THERMO ENVIRON. 49i	
Analysis	UV PHOTOMETRIC	
Ref Mtd ID	EQOA-0880-047	
Monitor Type	047	
Monitor Object.	BACKGROUND	
Dominant Source	AREA	
Meas. Scale	NEIGHBORHOOD	
Land Use Type	COMMERCIAL	
Location Setting	RURAL	
Elevation	930 FT ABOVE SEA LEVEL	
Closest Meteorological Site	CHATTANOOGA METROPOLITAN AIRPORT 1001 AIRPORT RD	
Date Site Established	8/01/1978 MOVED TO SDHS 2/1/2002, PM _{2.5} DELETED 12/31/15	

Site Evaluation 2020

Soddy Daisy High School, 618 Sequoyah Road 470651011

Street Name	Average Daily Traffic Counts: TDOT website	Distance
Sequoyah Road- in front of the school	9,238 2019 (Station #374)	.28 miles, 446 meters
Hyatte Road- behind the site	2,129 (Lovell Road- intersects with Hyatte Rd) 2019 (#306)	.02 mile, 39.74 meters

Direction	Predominant Land Use (Industry, Residential, Commercial or Agricultural)
North	School property- boys ball fields
South	Beyond Hyatte Road is residential, rural, agricultural
East	Soddy Daisy High School and Daisy Elementary, 620 Sequoyah Road
West	Girls softball field, beyond the field is Hyatte Road, beyond Hyatte Road is residential, rural, agricultural

Directions	Trees	Height (m)	Distance (m)
North	tree, tree	7.0 m, 10.8 m	26.0 m, 44.3 m
South	Tree Row	15 m	30.0 m
East	Tree Row	12.6 m	75.3m
West	Field House	2 story	74.2 m

Directions	Topographic Features (hills, valleys, rivers)	General Terrain (flat, rolling, rough)
North	Site is on hill	hill
South	Residential, farms	
East	Student parking lot below site	
West	Two story field house/concessions, parking lot and girls ball field on hill above site	Site is between an upper parking lot and a lower parking lot

Intake Height	
Soddy Daisy ozone	5.2 m

Soddy Daisy High School 470651011
North



Northeast



Soddy Daisy High School-470651011

East



Southeast



Soddy Daisy High School- 470651011
South



Southwest



Soddy Daisy High School 470651011
West



Northwest



EASTSIDE UTILITY



Rep Org Name	CHATTANOOGA HAMILTON COUNTY AIR POLLUTION CONTROL BUREAU	<p>This ozone site was originally established June 13, 1979, using a UV method on Volunteer Army Ammunition Plant (VAAP) property as site 470650028. According to notes in AQS, the ozone monitor was moved to the Laboratory Building on Patrol Road from 100-200 feet away about 1979. About 1982 the ozone monitor was moved to a trailer across the street and northwest of the lab in a wooded area. It was moved to Eastside Water Utility on the top of a hill in February, 2004, because of a road widening project which utilized the property on which the monitoring module sat. The site was moved more than two (2) miles which required changing the AQS identifying number from 470650028 to a new number, 470654003. The site is inside the Eastside Water Utility high security area.</p>
PQAO	0170	
Address	RESERVOIR RD (PRIVATE DRIVE), UTILITY OFFICE ADDRESS: 3018 HICKORY VALLEY ROAD	
AQSID	470654003, FORMERLY 0028	
County name	HAMILTON COUNTY	
CBSA	CHATTANOOGA/ NORTH GA	
Lat	35.102862	
Lon	-85.162243	
Parameter Code	44201	
Parameter	OZONE	
Monitor Type	SLAMS	
POC	1	
Int	1	
Year	2020	
Collection Freq	HOURLY	
Method	047	
FRM/FEM	THERMO ENVIRON. 49i	
Analysis	UV PHOTOMETRIC	
Ref Mtd ID	EQOA-0880-047	
Monitor Objective	TYPICAL CONCENTRATIONS	
Dominant Source	AREA	
Meas. Scale	URBAN	
Land Use Type	INDUSTRIAL	
Location Setting	URBAN AND CENTER CITY	
Elevation	940 FT ABOVE SEA LEVEL	
Closest Met Site	CHATTANOOGA METRO-POLITAN AIRPORT, 1001 AIRPORT ROAD	
Date Site Established	6/13/1979 Moved from 0028- 2/2004 for 3/1/2004 season	

Site Evaluation 2020

3018 Hickory Valley Road, Eastside Utility 470654003	
Street Name	Traffic Counts: Average Per Day TDOT webpage
Highway 58	31,255 2019 (Station #271)
Hickory Valley Road	10,546 2019 (#613)
Reservoir Road – private drive to Eastside Water Utility	3 or 4 vehicles a day and a few trucks as the county is dumping dirt in a hole on the hill
Interstate 75	74,354 2019 (#616)
Highway 153	73,233 2019 (#216) ; 73,050 2019 (#265)

Direction	Predominant Land Use (Industry, Residential, Commercial or Agricultural)
North	Commercial along Highway 58, residential beyond Highway 58
South	Undeveloped forest and Commercial/Industrial area
East	Forest
West	Forest to Highway 58, Commercial on Highway 58, then residential beyond

Directions	Trees/Buildings	Height (m)	Distance (m)
North	None		
South	Building- One story	1 story: 3.7 m	12.6 m
East	None		
West	SW- Building Tree behind building	2 story: top of gable: 7.3 m 14.5	20.7 m 30.4 m

Directions	Topographic Features (hills, valleys, rivers)	General Terrain (flat, rolling, rough)
North	Site is on top of a hill at about 900 feet. It is a wilderness area as the entire hill is a gated high-security area. A drive to the site is through a beautiful forest and past a lake. One encounters deer, wild turkeys, hawks, and buzzards. Site is on the north edge of the hill- almost hanging over Highway 58. To the north is looking down the hill.	6,372 acres were a TNT production plant (closed in mid 70s) controlled by the military that once housed nitric acid and sulfuric acid plants. About 1,000 acres are developed to the southeast of this monitoring site as a commercial/ industrial area around and including the Volkswagen Plant. The Highway 58 area at the bottom of the hill to the North is commercial. Highway 58 is a major highway running east/west.
South	One story building- Commercial	Flat on top of hill
East	Looking downhill	
West	Looking downhill	

Intake Height	
Eastside ozone	4.2 m

Eastside Utility -470654003
North



Northeast



Eastside Utility -470654003
East



Southeast



South, Southwest, and West cardinal directional pictures have been removed for security reasons. They have been supplied to EPA.

Northwest



SISKIN DRIVE/ UT Chattanooga



Rep Name	CHATTANOOGA-HAMILTON COUNTY AIR POLLUTION CONTROL BUREAU		
Org	0170		
Address	911 SISKIN DRIVE		
AQSID	470654002		
County	HAMILTON		
CBSA	CHATTANOOGA/ NORTH GEORGIA		
Lat	35.050918		
Lon	-85.293019		
Parameter	88101	88101	88101
Parameter	PM _{2.5}	PM _{2.5}	PM _{2.5} CONTINUOUS
Monitor	SLAMS	SLAMS	SLAMS
POC	1	2	3
Interval	7	7	1
Year	2020	2020	2020
Collection Freq.	3-DAY	12-day beginning 5/9	HOURLY
Method	145 VSCC	145 VSCC	236
FRM/FEM	R & P 2025 SEQ	R & P 2025 SEQ	T640 REG MODEL
Analysis	GRAVIMETRIC LAB: IML	GRAVIMETRIC LAB: IML	LIGHT SCATTERING
Ref Mtd ID	RFPS-0202-145	RFPS-0202-145	EQPM 0516-236 2.5 only
Objective	POPULATION		
Dom. Source	AREA		
Meas. Scale	URBAN		
Land Use	COMMERCIAL		
Location	URBAN/ CENTER CITY		
Elevation	720 FT ABOVE SEA LEVEL		
Closest Met	CHATTANOOGA METROPOLITAN AIRPORT, 1001 AIRPORT RD		
Date Estab.	1/01/1999	1/01/1999	2/15/2017

The Siskin Drive site was initially established January 1, 1999, as a CORE PM_{2.5} site with collocated FRM monitors on the roof of the Davenport Building, 529 Oak Street, on the University of Tennessee at Chattanooga campus. The monitors were moved to the Student Center roof, 650 East 5TH Street, about early 2000; moved to a temporary site behind the University Administration Building at 400 Palmetto Street in late 2003 where the TEOM was first installed; then to a new shelter at the current site March 15, 2004, at 911 Siskin Drive. Met One Speciation was added 12/1/2001; a continuous PM_{2.5} monitor was added 3/26/2004; and a URG3000 was added 10/1/2009. The continuous PM_{2.5} monitor (TEOM) was operated at 30°C and had an SES predryer. The predryer failed in 2013 and was removed. The temperature was then raised to 50°C. A different early model TEOM was used. EPA defunded the Met One speciation and the URG3000 monitors in January 2015, and speciation monitoring ceased. FRMs were converted from WINS to VSCC models January 1, 2017. A T640 continuous was added in January, 2017, as an SPM. It began reporting PM_{2.5} to AQS February 15, 2017. The shelter was replaced with a deck in June of 2018. At that time the TEOM was taken out of service and the T640 began reporting to AirNow. Beginning January 1, 2019, the T640 status was changed from SPM to SLAMS. The FRM POCs 1 and 2 and T640 data are now combined to compare against the standard. The data from whatever monitors are running each day are averaged for that day. The T640 retains POC 3. The POC 2 FRM changed from 3-day to 12-day monitoring on 5/9/19.

Site Evaluation 2020

911 Siskin Drive 470654002 (Former site on University of Tennessee at Chattanooga campus)

Street Names	Average Daily Traffic Counts: TDOT website
Siskin Drive	No counts: side road behind school
Third Street	17,136 2019 (Station #107)
Riverside Drive/Amnicola Highway	29,191 2019 (#108)

Direction	Predominant Land Use (Industry, Residential, Commercial or Agricultural)
North	Commercial –Power Utility Fenced Enclosure for large transformers
South	School baseball field- Erlanger Hospital and Health Department in background
East	Siskin Rehabilitation Facility
West	Commercial-Power Utility Fenced Enclosure. Beyond Siskin Drive to the south are parking lots and buildings for school, Chattanooga School for Arts and Sciences, K-12. The school, parking lots, and athletic fields occupy the entire block bordered by Siskin Drive, Third Street, and Siskin Rehabilitation Facility

Directions	Trees/Buildings	Height (m)	Distance (m) from Siskin1	Distance (m) From Siskin 2	Distance (m) from T640
North	NE-Tree line	6.0	34.8	36.4	34.8
	NW-Tree in Utility Enclosure	6.4	32.28	33.2	31.2
South					
East					
West					

Directions	Topographic Features (hills, valleys, rivers)	General Terrain (flat, rolling, rough)
North	Site is on a small rise NE	Hill rises to north
South	School facilities	Hill
East	Two story building- Rehabilitation Facility	Hill
West	Transformer Enclosure	Hill

Intake Heights	
Siskin 1 FRM	2.6 m
Siskin 2 FRM	2.6 m
T640	2.8 m

Siskin Drive-470654002
North



Northeast



Siskin Drive-470654002
East



Southeast



Siskin Drive-470654002

South



Southwest



Siskin Drive-470654002

West



Northwest



East Ridge City Hall-Tombras Avenue



Rep Org name	CHATTANOOGA HAMILTON COUNTY AIR POLLUTION CONTROL BUREAU	The PM _{2.5} site was originally established 5/6/1999 on the roof of the East Ridge Post Office, 1510 Maxwell Road, in the municipality of East Ridge in South Hamilton County near the Georgia border. It was moved to a temporary location behind the East Ridge City Hall on November 20, 2007. It was moved to a permanent location on the same property about 110 feet north on January 1, 2009. This site is roughly 3.5 miles from the Maple Street, North Georgia site, operated by the State of Georgia. The FRM was converted from WINS to VSCC on January 1, 2017.
PQAO	0170	
Address	1517 TOMBRAS AVENUE, EAST RIDGE	
AQSID	470650031	
County Name	HAMILTON	
CBSA	CHATTANOOGA/ NORTH GEORGIA	
Lat	34.99438	
Lon	-85.24293	
Parameter Code	88101	
Parameter Name	PM _{2.5}	
Monitor Type	SLAMS	
POC	1	
Int	7	
Year	2020	
Collection Frequency	3 DAY	
Method	145-VSCC	
FRM/FEM instrument	R & P 2025 SEQ	
Analysis	GRAVIMETRIC -LAB: IML	
Ref Mtd ID	RFPS-0202-145	
Monitor Objective	POPULATION EXPOSURE	
Dominant Source	AREA	
Measurement Scale	NEIGHBORHOOD	
Land Use Type	COMMERCIAL	
Location Setting	URBAN AND CENTER CITY	
Elevation	720 FT ABOVE SEA LEVEL	
Closest Meteorological Site	CHATTANOOGA METROPOLITAN AIRPORT 1001 AIRPORT ROAD	
Date Site Established	5/6/1999 on POST OFFICE, MOVED 11/20/2007 TO BEHIND ER CITY HALL	

Site Evaluation 2020

1517 Tombras Avenue 470650031

(Former site at East Ridge Post Office, 1510 Maxwell Road)

Street Name	Average Daily Traffic Counts: TDOT website	Approximate Distance
Tombras Avenue	About 4,452 (Bennett Road) 2019 (Station #488)	.06 mile or 100 meters
Ringgold Road	21,412 2019 (#133)	.17 mile or 269 meters

Direction	Predominant Land Use (Industry, Residential, Commercial or Agricultural)
North	East Ridge High School (134 m), NE ER Community Center (64.8 m- 1 story)
South	Residential
East	City Hall, beyond City Hall is residential
West	Residential – municipality has highest population density in Hamilton County

Directions	Trees/Buildings	Height (m)	Distance (m)
Northwest	NW-Treeline Closest trees (1)	11.0 m	17.3 m
	(2)	14.0 m	19.4 m
South, SE	SE-3 Trees 1,2,3	9.2 m; 9.0 m; 9.0 m	19.7 m; 28.5 m; 31.9 m
	S-Treeline	18.0 m	41.4 m
East	One story building (City Hall)	3.7 m	22.5 m
West	Tree line	18.2	28.2
Southwest	Tree line	22.2	35.0

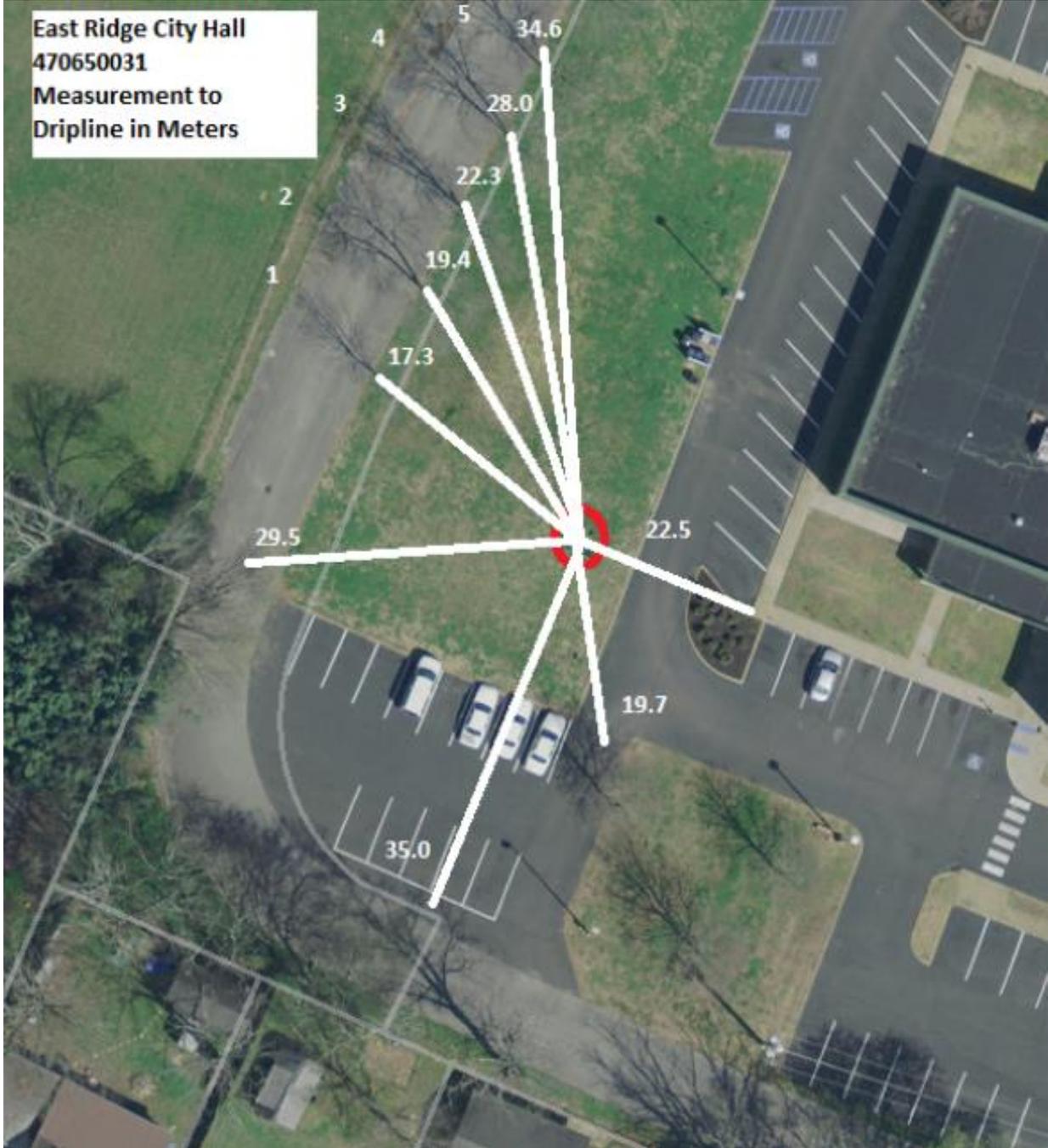
Directions	Topographic Features (hills, valleys, rivers)	General Terrain (flat, rolling, rough)
North	Flat	Flat
South	Flat	Flat
East	Flat	Flat
West	Flat	Flat

Intake Height	
East Ridge FRM	2.4 m

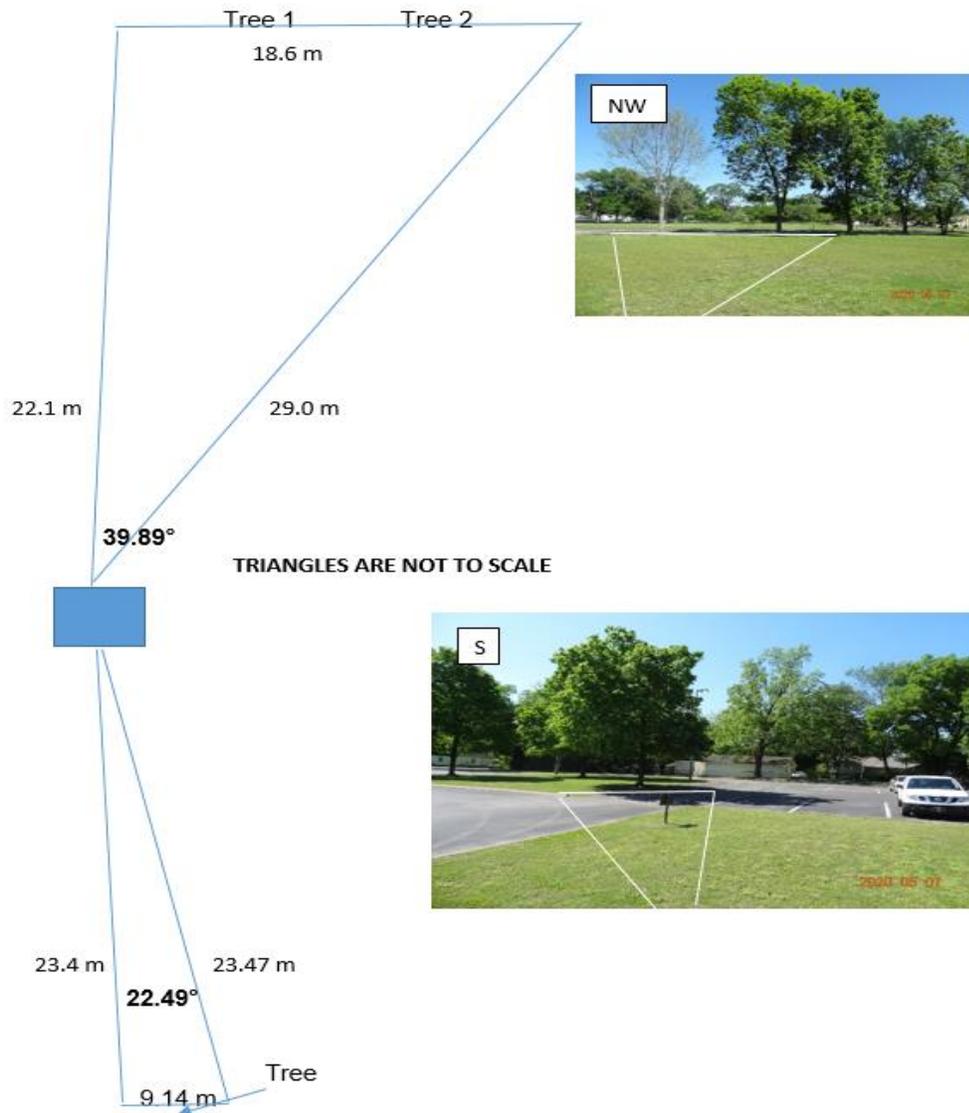
Figure 10- Aerial View of East Ridge City Hall Site 2018



Figure 11- East Ridge City Hall Marked with Distances to Driplines



Two trees to the Northwest of the site can be classified as obstructions and one tree to the south. A calculation was required to determine how much of the 90° quadrant was obstructed by the trees to the Northwest. The angle is calculated as 39.89°. The angle for the tree to the south is 22.49°. This means the air flow is obstructed 62.38°. Photographs are included to illustrate that the three trees in question are obstructing less than 90°. In the picture labeled Northwest, the left two trees are the ones obstructing as indicated by the imposed triangle. In the South view it is the central tree.



East Ridge City Hall- Tombras Avenue-470650031

North



Northeast



East Ridge City Hall- Tombras Avenue-470650031

East



Southeast



East Ridge City Hall- Tombras Avenue-470650031
South



Southwest



East Ridge City Hall- Tombras Avenue-470650031
West



Northwest



Appendix A
Memorandum of Understanding with State of Georgia

MEMORANDUM OF AGREEMENT

ON AIR QUALITY MONITORING FOR CRITERIA POLLUTANTS FOR

THE CHATTANOOGA-WALKER COUNTY

METROPOLITAN STATISTICAL AREA MSA

December 28, 2017

Participating Agencies:

Georgia

Georgia Department of Natural Resources (GA DNR)
Environmental Protection Division GA EPD APB

Tennessee

Chattanooga-Hamilton County Air Pollution Control Bureau (CHCAPCB)

I. PURPOSE/OBJECTIVES/GOALS

The purpose of the Memorandum of Agreement (MOA) is to establish the Chattanooga-Hamilton County-Walker County Metropolitan Statistical Area (MSA) Criteria Pollutant Air Quality Monitoring Agreement between CHCAPCB and GAEPDAPB (collectively referred to as the "affected agencies") to collectively meet United States Environmental Protection Agency (EPA) minimum monitoring requirements for particles of an aerodynamic diameter of 10 micrometers and less (PM10), particles of an aerodynamic diameter of 2.5 micrometers and less (PM2.5), and ozone; as well as other criteria pollutant air quality monitoring deemed necessary to meet the needs of the MSA as determined reasonable by all parties. This MOA will establish the terms and conditions of this collective agreement to provide adequate criteria pollutant monitoring for the Chattanooga-Hamilton County-Walker Co, GA MSA as required by 40 CFR 58 Appendix D, Section 2, (e) (March 28, 2016)¹.

II. BACKGROUND

The Chattanooga-Hamilton Co-Walker Co, GA MSA consists of the following counties: Dade, Walker, Catoosa, Hamilton, Marion, and Sequatchie. GA EPD APB has jurisdiction over Dade, Walker, and Catoosa Counties in Georgia and CHCAPCB has jurisdiction over Hamilton County, Tennessee. The State of Tennessee has jurisdiction over Marion and Sequatchie Counties in Tennessee, but does not have any permanent air monitoring sites in those counties. The CHCAPCB and GA EPD APB are required by the Clean Air Act to measure for certain criteria pollutants in the ambient air in the Chattanooga-Hamilton County-Walker Co, GA Metropolitan Statistical Area (MSA). The United States Environmental Protection Agency (EPA) has established minimum monitoring requirements based on the size of the MSA and the quality of the air in the

MSA for particles of an aerodynamic diameter of 10 micrometers and less (PM10), particles of an aerodynamic diameter of 2.5 micrometers and less (PM2.5), and ozone.

40 CFR 58 Appendix D, Section 2, (e)¹ states (in part):

“...The EPA recognizes that there may be situations where the EPA Regional Administrator and the affected State or local agencies may need to augment or to 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.”¹

Currently each air pollution control agency (affected agency) conducts monitoring in its respective jurisdiction and coordinates its monitoring with the other air pollution control agencies within the MSA.

I. ROLES AND RESPONSIBILITIES

The parties agree to the following terms and conditions:

- CHCAPCB and GA EPD APB (the “affected agencies”) commit to conducting appropriate monitoring in their respective jurisdictions of the MSA; as needed, to collectively meet EPA minimum monitoring requirements for the entire MSA for PM10, PM2.5, and ozone, as well as other criteria air pollutant monitoring deemed necessary to meet the needs of the MSA as determined reasonable by all affected agencies. The minimum air quality monitoring requirement (for PM10, PM2.5, and ozone described in 40 CFR 58) for the MSA shall apply to the MSA in its entirety and shall not apply to any sole affected agency within the MSA unless agreed upon by all affected agencies.
- The affected agencies commit to coordinating monitoring “...responsibilities and requirements...to achieve an effective network design...”¹ regarding criteria air pollutant monitoring conducted in the MSA and commit to communicate unexpected or unplanned changes in monitoring activities within their jurisdictions to the other affected agencies of this MOA. 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 e-mail of any monitoring changes occurring in 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 similar occurrences that result in a loss of more than 25% data in a quarter or a permanent change in the monitoring network. At least once a year in the second quarter of the year or before June 15th, each agency shall make available to the other agencies who are a party to this agreement, a copy of its proposed monitoring plan for the MSA for the next

year. The CHCAPCB will submit the network review that is submitted to the State of Tennessee for inclusion in the State's monitoring plan.

- Each party reserves the right to revoke or terminate this MOA at any time and for any reason by giving thirty (30) days written notice prior to the date of termination.

III. LIMITATIONS

- A. All commitments made in this MOA are subject to the availability of appropriated funds and each party's budget priorities. Nothing in this MOA, in and of itself, obligates CHCAPCB or GA EPD APB to expend appropriations or to enter into any contract, assistance agreement, interagency agreement or other financial obligation.

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

- C. Except as provided in Section III, this MOA does not create any right or benefit, substantive or procedural, enforceable by law or equity against CHCAPCB or GA EPD APB, their officers or employees, or any other person. This MOA does not direct or apply to any person outside CHAPCD or GAEPD APB.

V. PROPRIETARY INFORMATION AND INTELLECTUAL PROPERTY

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

VI. POINTS OF CONTACT

The following individuals are designated points of contact for the MOA:

GA EPD APB DeAnna G. Oser
GAEPD APB Ambient Monitoring Program
4244 International Parkway, Suite 120
Atlanta, GA 30354

DeAnna.Oser@dnr.ga.gov

Voice: (404) 363-7004

FAX: (404) 363-7100

CHCAPCB Robert Colby
CHCAPCB
6125 Preservation Dr
Chattanooga, Tn 37416

rcolby@chattanooga.gov

Voice: (423) 643-5999

FAX: (423) 643-5972

VII. MODIFICATION/DURATION/TERMINATION

This MOA will be effective when signed by all parties. This MOA may be amended at any time by the mutual written consent of the parties. The parties will review this MOA at least once every 10 years to determine whether it should be revised, renewed, or cancelled. This MOA may be revoked or terminated by an affected agency at any time and for any reason by giving thirty (30) days written notice prior to the date of termination.

VIII. REFERENCE

1 – United States Environmental Protection Agency, Title 40 Code of Federal Regulations, Part 58, Appendix D, “Network Design Criteria for Ambient Air Quality Monitoring”, Section 2 (e), “General Monitoring Requirements”.

IX. APPROVALS

**Georgia Department of Natural Resources, Environmental Protection Division
Air Protection Branch (GA EPD APB)**

BY: 
TITLE: DIRECTOR
DATE: 1/24/18

Chattanooga-Hamilton County Air Pollution Bureau (CHCAPCB)

BY: 
TITLE: Director
DATE: January 3, 2018

Nashville-Davidson County Air Monitoring Network Plan 2020

Prepared by Gillian Walshe-Langford Ph.D.
and
Morgan Dickie



*Metro***Public Health***Dept*
Nashville/Davidson County

Promoting and Protecting Health

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2.0 Nashville Air Monitoring Network Review 2020

2.1 Introduction

Beginning January 1, 2015, the Nashville-Davidson County Air Monitoring program (Nashville) became its own Primary Quality Assurance Organization (PQAO) where previously, it was one PQAO with the State of Tennessee's Department of Environment and Conservation (TDEC). Requirements for the Nashville-Davidson-Murfreesboro-Franklin Core-Based Statistical Area (CBSA) are met by the monitors run by both Nashville and TDEC's air monitoring networks. The following document provides information on the current monitoring network, any proposed changes to the network, site descriptions, site evaluations, and an inventory of all instruments and their current condition. It is intended to fulfill the requirements of 40 CFR Part 58.10, where each monitoring organization must review their network on an annual basis in order to ensure that all requirements within appendices A, B, C, D, and E of Part 58 are being met.

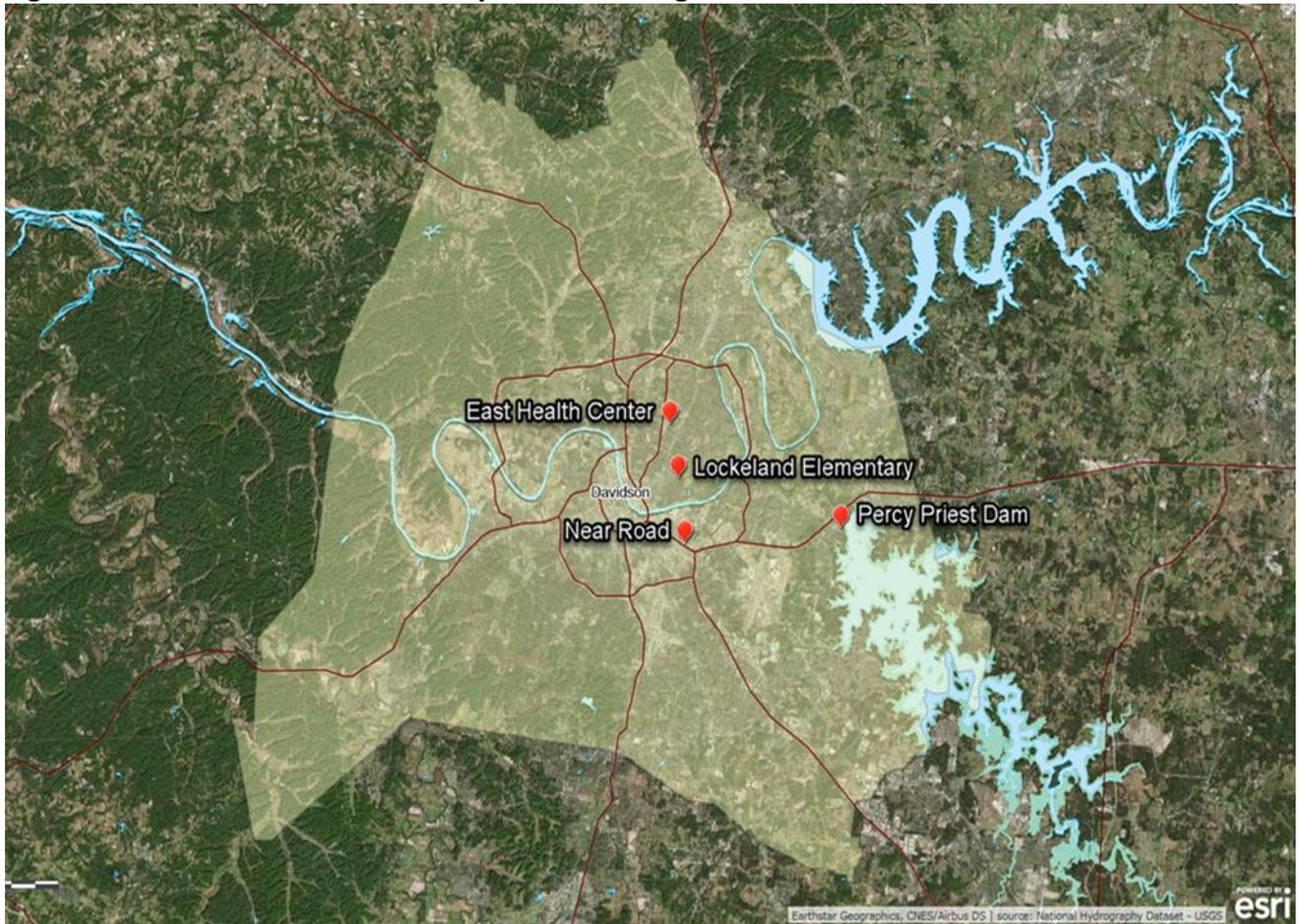
2.2 Current Ambient Air Monitoring Network of Nashville-Davidson County

The 2020 Nashville-Davidson County monitoring network had no significant changes made from 2019. Nashville has 4 sites in operation for 2020: East Health Center which monitors for NO₂ and O₃; Lockeland Elementary School which monitors continuous PM₁₀, and both regulatory and AQI specific PM_{2.5}; the Percy Priest Dam site which monitors for O₃; and the Near Road site which monitors for CO, NO₂, SO₂, and PM_{2.5}. See the map of Davidson County (Figure 1) below for the locations of Nashville's 2020 monitoring network.

One change made from 2019 to 2020 was the site monitoring for SO₂ was changed from East Health Center to the Near Road site. Due to a change in instrumentation from a Thermo 43i to a Thermo 43iQ monitor, East Health Center was no longer viable for SO₂ monitoring. The new 43iQ instrument has a much lower flow than the previously used 43i monitor and as such increases the residence time for SO₂ to 28 seconds – which is well above the 20 second requirement. Moving SO₂ monitoring to our already established Near Road Site (47-037-0040) eliminated this problem as the sampling distance at this site is significantly shorter than at the East Health Center.

For the Nashville-Davidson-Murfreesboro-Franklin CBSA, only one PM₁₀ monitor is running at this time. Two PM₁₀ monitors are required by 40 CFR Part 58, Appendix D, Section 4.6 for the CBSA but EPA approved a waiver for this requirement in the 2016 Network Plan response due to the historically low concentrations recorded in Davidson County. This waiver will be reviewed again in the 2020 five-year network assessment. For all other pollutants, PM_{2.5}, O₃, SO₂, NO₂, and CO, the minimum monitoring requirements of the CFR are being met for the CBSA

Figure 2-1 Nashville-Davidson County Air Monitoring Network



2.3 Proposed Changes to Air Monitoring Network

No major changes are proposed to take place in 2020 for the Nashville-Davidson County Monitoring Network.

2.3.1 Ozone Monitoring

No changes are proposed for this portion of the Nashville Davidson County Air Monitoring Network.

2.3.2 PM₁₀ Monitoring

No changes are proposed for this portion of the Nashville Davidson County Air Monitoring Network. However due to the damage at the Lockeland site in the Tornado of March 3rd, 2020, some equipment changes will be taking place. Details can be found in Section 7 – Appendix B – 2020 Tornado Damage at Lockeland Monitoring site.

2.3.3 PM_{2.5} Monitoring

No changes are proposed for this portion of the Nashville Davidson County Air Monitoring Network. However due to the damage at the Lockeland site in the Tornado of March 3rd, 2020, some equipment changes will be taking place. Details can be found in Section 7 – Appendix B – 2020 Tornado Damage at Lockeland Monitoring site.

2.3.4 Nitrogen Dioxide Monitoring

No changes are proposed for this portion of the Nashville Davidson County Air Monitoring Network.

2.3.5 Carbon Monoxide Monitoring

No changes are proposed for this portion of the Nashville Davidson County Air Monitoring Network.

2.3.6 Sulfur Dioxide Monitoring

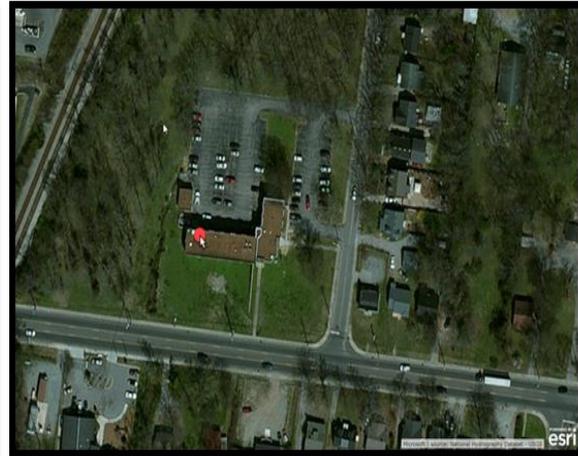
No changes are proposed for this portion of the Nashville Davidson County Air Monitoring Network.

Last year, Nashville proposed that the last day of SO₂ monitoring at East Health Center be December 31st, 2019, with monitoring at Near Road begin January 1st, 2020. This change was justified in the 2019 Annual Network Plan and approved by EPA. The move was successfully completed and SO₂ monitoring for 2020 will be reported from the Near Road Site.

3.0 Site Descriptions

3.1 East Health Center

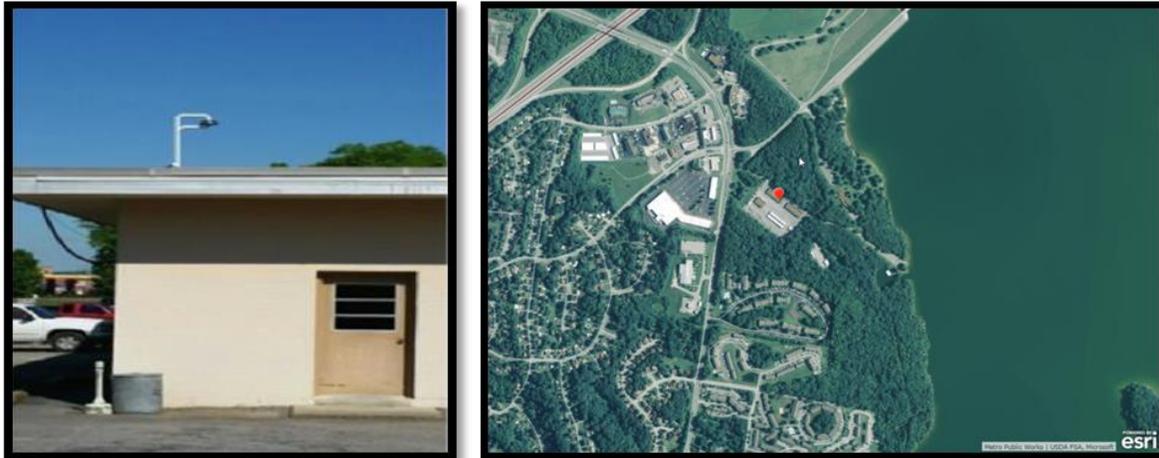
The East Health Center site monitors for ozone and nitrogen dioxide. This site has been in operation since 1972 and will continue to monitor for these two pollutants in 2020; SO₂ monitoring was moved from this site to the Near Road Site beginning January 1, 2020.



Agency Name (Code)	Metro Public Health Department (0682)	
AQS ID	470370011	
County Name	Davidson	
Address	1015 Trinity Lane	
CBSA	34980	
Latitude, Longitude	36.205000, -86.744722	
Parameter Code	42602	44201
Parameter Name	NO ₂	O ₃
Monitor Type	SLAMS	SLAMS
POC	1	1
Collection Frequency	Hourly	Hourly
Method	074	047
Monitoring Instrument	Thermo 42i	Thermo 49i
Analysis	Chemiluminescence	Photometric
Ref. Method ID	RFNA-1289-074	EQOA-0880-047
Monitor Objective Type	Highest Concentration	Population Exposure
Dominant Source	Area	Area
Measurement Scale	Neighborhood	Neighborhood
Land Use Type	Residential	Residential
Location Setting	Urban	Urban
Date Established	1/6/1975	1/1/1972

3.2 Percy Priest Dam – Davidson County, TN

The Percy Priest Dam site is located on the Army Corps of Engineers Percy Priest Dam campus. Ozone is the only pollutant monitored at this site. Monitoring for ozone began on 1/1/1978 and will continue to operate for the 2020-2021 ozone season.



Agency Name (Code)	Metro Public Health Department (0682)
AQS ID	470370026
County Name	Davidson
Address	3711 Bell Road
CBSA	34980
Latitude, Longitude	36.150742, -86.623301
Parameter Code	44201
Parameter Name	O ₃
Monitor Type	SLAMS
POC	1
Collection Frequency	Hourly
Method	047
Monitoring Instrument	Thermo 49i
Analysis	Photometric
Ref. Method ID	EQOA-0880-047
Monitory Objective Type	Highest Concentration
Dominant Source	Area
Measurement Scale	Urban
Land Use Type	Agricultural
Location Setting	Urban
Date Established	1/1/1978

3.3 Lockeland Elementary School – Davidson County, TN

The Lockeland Elementary School monitoring site began operation in 1999 and will continue operation in 2020. This site was defunded as a CSN site and shut down the SASS and URG monitors at the end of 2014. As of January 1, 2017, a PM₁₀ TEOM monitor began operating at this location as the Hi-Vol PM₁₀ monitors at Trevecca and McCann were approved to be shut down by the end of 2016 by EPA. Starting July 1, 2019 we added a FEM (POC 3) MetOne BAM 1022 PM_{2.5} monitor to this site to replace the Thermo 2025i FRM (POC 1) monitor, which was removed. The decision to replace the FRM with an FEM was justified in the 2019 Annual Network Plan and approved by EPA.

Please refer to Section 7.0 **Appendix B – 2020 Tornado Damage to Lockeland Site** for more information on this exceptional event that occurred March 3rd, 2020 and our plans for reequipping the site.

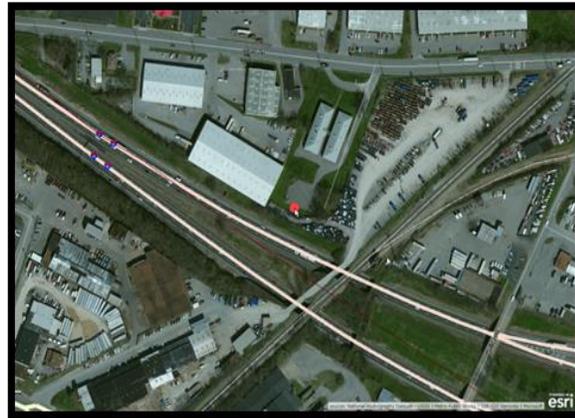


Agency Name (Code)	Metro Public Health Department (0682)			
AQS ID	470370023			
County Name	Davidson			
Address	105 South 17th Street			
CBSA	34980			
Latitude, Longitude	36.176326, -86.738902			
Parameter Code	88101	88101	88502	81102
Parameter Name	PM _{2.5}	PM _{2.5}	PM _{2.5}	PM ₁₀
Monitor Type	SLAMS	SLAMS	AQI	SLAMS
POC	2	3	3	2
Collection Frequency	1:6	Hourly	Hourly	Hourly
Method	145	209	717	079

Monitoring Instrument	Thermo 2025i	MetOne BAM 1022	Thermo 1405	Thermo 1405
Analysis	Gravimetric	Beta Attenuation	Gravimetric	Gravimetric
Ref. Method ID	EQPM-0202-145	EQPM-1013-209	AQI only	EQPM-1090-079
Monitor Objective Type	Pop Exposure	Pop Exposure	Pop Exposure	Pop Exposure
Dominant Source	Area	Area	Area	Area
Measurement Scale	Neighborhood	Neighborhood	Neighborhood	Neighborhood
Land Use Type	Residential	Residential	Residential	Residential
Location Setting	Urban	Urban	Urban	Urban
Date Established	1/1/1999	1/1/1999	3/1/2001	1/1/2017

3.4 Near Road Site – Davidson County

The Near Road site is located along the I-24/I-40 split in downtown Nashville and was established as part of the near road NO₂ monitoring requirement. Carbon monoxide and nitrogen dioxide monitors have been in operation since the site began monitoring on July 1, 2014. From January 1, 2017 to July 1, 2019 a PM_{2.5} FRM monitor (Thermo 2025i) was also in operation. Starting on July 1, 2019 the FRM monitor was removed and replaced by an FEM PM_{2.5} monitor (MetOne BAM 1022). As of January 1, 2020, SO₂ monitoring began at this site after being moved from the East Health Center Site.



Agency Name	Metro Public Health Department (0682)			
AQS ID	470370040			
County Name	Davidson			
Address	1113 Elm Hill Pike			
CBSA	34980			
Latitude,	36.142377, -86.734142			
Parameter Code	42101	42602	42401	88101
Parameter Name	CO	NO ₂	SO ₂	PM _{2.5}

Monitor Type	SLAMS	SLAMS	SLAMS	SLAMS
POC	1	1	1	3
Collection	Hourly	Hourly	Hourly	Hourly
Method	093	074	060	209
Monitoring Instrument	Teledyne T300	Thermo 42i-TL	Thermo 43iQ	MetOne BAM 1022
Analysis	Infrared	Chemiluminescence	Pulsed Fluorescence	Beta Attenuation
Ref. Method ID Type	RFCA-1093-093	RFCA-1289-574	EQSA-0486-060	EQPM-1013-209
Monitor Objective	Population Exposure	Population Exposure	Population Exposure	Population Exposure
Dominant Source	Area	Area	Area	Area
Measurement	Urban	Urban	Urban	Urban
Land Use Type	Industrial	Industrial	Residential	Industrial
Location Setting	Urban	Urban	Urban	Urban
Date Established	7/1/2014	7/1/2014	1/1/2020	1/1/2017

4.0 Annual Site Assessments

Each year, siting evaluations are performed to assess the impact on obstructions such as trees and buildings on the inlets at our sampling sites. These should be measured while the leaf canopy is full in order to assess the potential issues fully. The site assessments below, which include a table of measurements from obstructions and directional photos, show that each monitoring location is meeting the requirements of 40 CFR Part 58, Appendix E and have each been carried out in the last calendar year. Appendix A of this document includes the Site Evaluation Form template used to conduct site evaluations.

Site Pollutant	Probe Inlet Height (IH)	Obstruction Height (OH)	Dripline	Type of Obstruction	Unrestricted Airflow	Findings
East Health Center – Evaluated 9/30/2019						
O ₃	7.0m 10.4m	17.2m	19.4m	Trees	300°	Site OK; trees to the north and east will be monitored.
NO ₂	7.0m 10.4m	17.2m	19.4m	Trees	300°	
SO ₂	7.0m 10.4m	17.2m	19.4m	Trees	300°	
Percy Priest Dam – Evaluated 9/30/2019						

O ₃	5.3m	24.3m	38.4m	Trees	305°	Site OK; trees to the north will be monitored.
Lockeland – Evaluated 9/30/2019						
PM _{2.5} Primary	5.8m	16.6m	25.4m	Trees	270°	Site OK; Trees near playground will be monitored.
PM _{2.5} Collocated	5.8m	16.6m	25.4m	Trees	270°	
PM _{2.5} AQI	5.8m	16.6m	25.4m	Trees	270°	
PM ₁₀	5.8m	16.6m	25.4m	Trees	270°	
Near Road – Evaluated 9/30/2019						
CO	4.5m	12.2m	19.6m	Trees	280°	Site OK; vegetation removal around site occurs annually.
NO ₂	4.5m	12.2m	19.6m	Trees	280°	
PM _{2.5}	4.5m	12.2m	19.6m	Trees	280°	

4.1 Annual Site Assessment Photos

4.1.1 East Health Center

North



South



East



West



4.1.2 Percy Priest Dam

North



South



East



West



4.1.3 Lockeland Elementary

North



South



East



West



4.1.4 Near Road Site

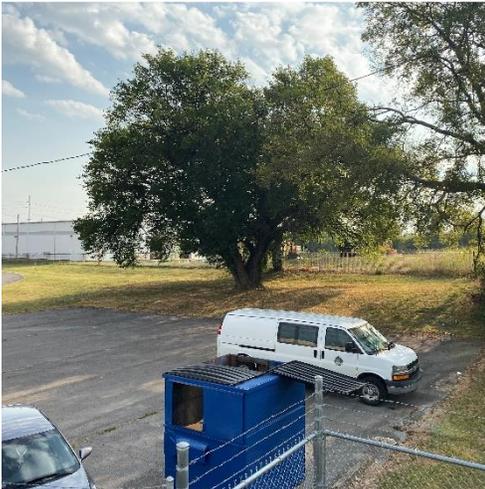
North



South



East



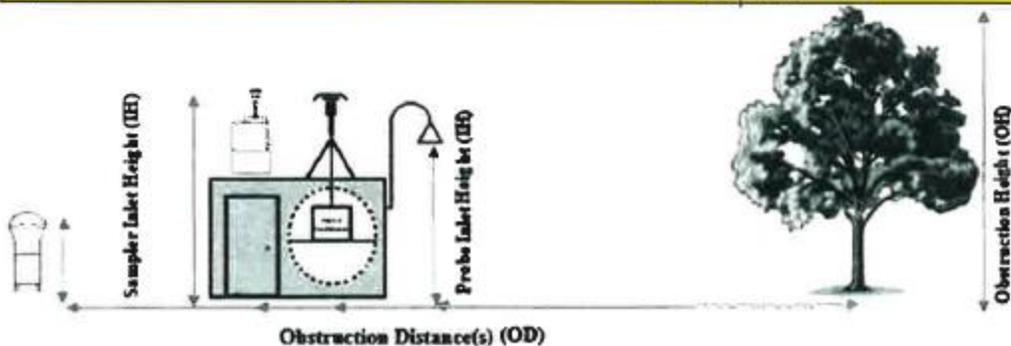
West



4.2 Annual Site Assessment Sheets

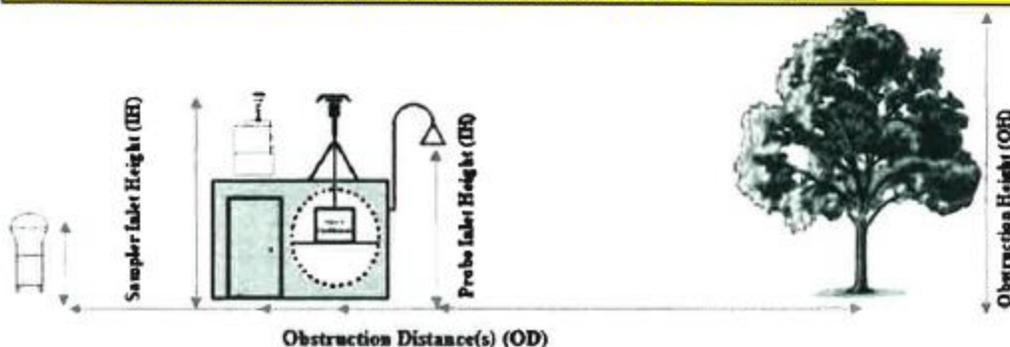
4.2.1 East Health Center

Site Evaluation Form				
Site Name: <u>East</u>		Date: <u>9-30-19</u>		
AQS site no: <u>47-037-0011</u>		Inspected by: <u>Hannah Maxwell</u>		
Coordinates: <u>36.204643-87.744787</u>		Signature: <u>Hannah Maxwell</u>		
Scale: <u>Neighborhood Scale</u>		Time: <u>8:00 AM</u>		
Particulate Monitors				
	PM 2.5	PM 2.5 Collocated	PM10	TEOM
Probe Inlet Height (IH) (m)				
Distance to nearest road (m)				
Obstruction Type				
Obstruction Height (OH) (m)				
Obstruction Distance (OD) MUST be $\geq (2 * \text{Obstruction Height} - \text{Probe Height})$				
OD $\geq 2 * (OH - IH)$				
Collocated distance (m)				
Unrestricted Airflow (degrees)				
Dripline (m)				
Gaseous Monitors				
	CO	Ozone	NOx	SO2
Probe Inlet Height (IH) (m)		<u>7m 10.4m</u>	<u>7m 10.4m</u>	<u>7m 10.4m</u>
Distance to nearest road (m)		<u>31m</u>	<u>31m</u>	<u>31m</u>
Obstruction Type		<u>tree</u>	<u>tree</u>	<u>tree</u>
Obstruction Height (OH) (m)		<u>17.2m</u>	<u>17.2m</u>	<u>17.2m</u>
Obstruction Distance (OD) MUST be $\geq (2 * \text{Obstruction Height} - \text{Probe Height})$				
OD $\geq 2 * (OH - IH)$				
OD $\geq 2(17.2 - 10.4) = 13.6$				
Collocated distance (m)				
Unrestricted Airflow (degrees)		<u>300</u>	<u>300</u>	<u>300</u>
Dripline (m)		<u>19.4</u>	<u>19.4</u>	<u>19.4</u>
Are all probes at least 1 meter apart? <u>YES</u>				
Are all probes located in an area that is paved or with vegetative cover? <u>YES</u>				
Are all rooftop samplers located at least 2 meters away from any structure? <u>YES</u>				
Has your visit been recorded in site logbook? <u>YES</u> Have you taken photos? <u>YES</u>				
Unrestricted airflow MUST be greater than 270° <u>Pass/Fail</u> <u>PASS</u>				
Obstruction Distance limit <u>Pass/Fail</u> <u>PASS</u>				
Dripline MUST be at least 10 m away when tree is obstruction <u>Pass/Fail</u> <u>PASS</u>				



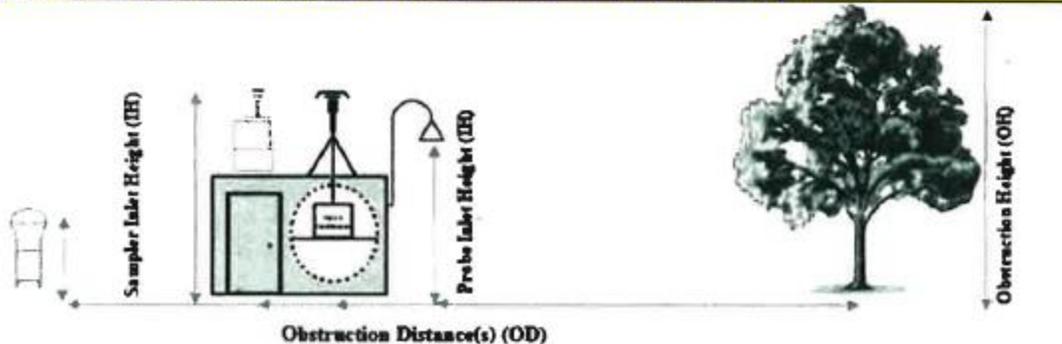
4.2.2 Percy Priest Dam

Site Evaluation Form				
Site Name: <u>Percy Priest Dam</u>	Date: <u>9-30-19</u>			
AQS site no: <u>47-037-002C</u>	Inspected by: <u>Greg Howery</u>			
Coordinates: <u>36.150782, -86.623316</u>	Signature:			
Scale: <u>Urban</u>	Time: <u>10:00</u>			
Particulate Monitors				
	PM 2.5	PM 2.5 Collocated	PM10	TEOM
Probe Inlet Height (IH) (m)	/	/	/	/
Distance to nearest road (m)	/	/	/	/
Obstruction Type	/	/	/	/
Obstruction Height (OH) (m)	/	/	/	/
Obstruction Distance (OD) MUST be $\geq (2 \times \text{Obstruction Height} - \text{Probe Height})$				
OD $\geq 2 \times (\text{OH} - \text{IH})$				
Collocated distance (m)	/	/	/	/
Unrestricted Airflow (degrees)	/	/	/	/
Dripline (m)	/	/	/	/
Gaseous Monitors				
	CO	Ozone	NOx	SO2
Probe Inlet Height (IH) (m)	/	<u>5.3m</u>	/	/
Distance to nearest road (m)	/	<u>16.4m</u>	/	/
Obstruction Type	/	<u>Tree</u>	/	/
Obstruction Height (OH) (m)	/	<u>24.3m</u>	/	/
Obstruction Distance (OD) MUST be $\geq (2 \times \text{Obstruction Height} - \text{Probe Height})$				
OD $\geq 2 \times (\text{OH} - \text{IH})$				
Collocated distance (m)	/	/	/	/
Unrestricted Airflow (degrees)	/	<u>305</u>	/	/
Dripline (m)	/	<u>38.4m</u>	/	/
Are all probes at least 1 meter apart? <u>Yes</u>				
Are all probes located in an area that is paved or with vegetative cover? <u>Yes</u>				
Are all rooftop samplers located at least 2 meters away from any structure? <u>Yes</u>				
Has your visit been recorded in site logbook? <u>Yes</u> Have you taken photos? <u>Yes</u>				
Unrestricted airflow MUST be greater than 270° Pass/Fail <u>Pass</u>				
Obstruction Distance limit Pass/Fail <u>Pass</u>				
Dripline MUST be at least 10 m away when tree is obstruction Pass/Fail <u>Pass</u>				

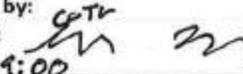


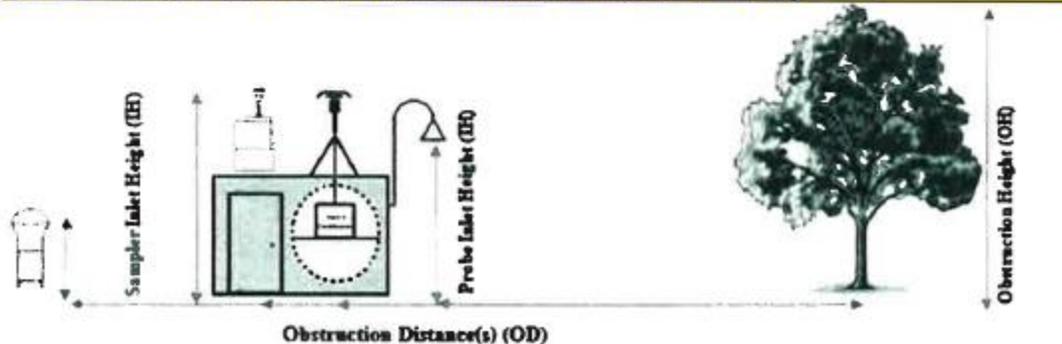
4.2.3 Lockeland Elementary

Site Evaluation Form				
Site Name: <u>Lockeland</u>		Date: <u>9-30-19</u>		
AQS site no: <u>47-0091-0023</u>		Inspected by: <u>Greg Hower</u>		
Coordinates: <u>36.176326, -86.739902</u>		Signature:		
Scale: <u>Neighborhood</u>		Time: <u>9:30</u>		
Particulate Monitors				
	PM 2.5	PM 2.5 Collocated	PM10	TEOM
Probe Inlet Height (IH) (m)	<u>5.8</u>	<u>5.8</u>	<u>5.8</u>	<u>5.8</u>
Distance to nearest road (m)	<u>66</u>	<u>66</u>	<u>66</u>	<u>66</u>
Obstruction Type	<u>Tree</u>	<u>Tree</u>	<u>Tree</u>	<u>Tree</u>
Obstruction Height (OH) (m)	<u>16.6</u>	<u>16.6</u>	<u>16.6</u>	<u>16.6</u>
Obstruction Distance (OD) MUST be $\geq (2 * \text{Obstruction Height} - \text{Probe Height})$				
OD $\geq 2 * (\text{OH} - \text{IH})$				
Collocated distance (m)	<u>3.6</u>	<u>3.6</u>	<u>3.6</u>	<u>3.6</u>
Unrestricted Airflow (degrees)	<u>270</u>	<u>270</u>	<u>270</u>	<u>270</u>
Dripline (m)	<u>25.4</u>	<u>25.4</u>	<u>25.4</u>	<u>25.4</u>
Gaseous Monitors				
	CO	Ozone	NOx	SO2
Probe Inlet Height (IH) (m)				
Distance to nearest road (m)				
Obstruction Type				
Obstruction Height (OH) (m)				
Obstruction Distance (OD) MUST be $\geq (2 * \text{Obstruction Height} - \text{Probe Height})$				
OD $\geq 2 * (\text{OH} - \text{IH})$				
Collocated distance (m)				
Unrestricted Airflow (degrees)				
Dripline (m)				
Are all probes at least 1 meter apart? <u>Yes</u>				
Are all probes located in an area that is paved or with vegetative cover? <u>Yes</u>				
Are all rooftop samplers located at least 2 meters away from any structure? <u>Yes</u>				
Has your visit been recorded in site logbook? <u>Yes</u> Have you taken photos? <u>Yes</u>				
Unrestricted airflow MUST be greater than 270° Pass/Fail <u>Pass</u>				
Obstruction Distance limit Pass/Fail <u>Pass</u>				
Dripline MUST be at least 10 m away when tree is obstruction Pass/Fail <u>Pass</u>				



4.2.4 Near Road Site

Site Evaluation Form				
Site Name: <u>New Road</u>		Date: <u>9-30-19</u>		
AQS site no: <u>47-032-0040</u>		Inspected by: <u>GTW</u>		
Coordinates: <u>36.142379, -86.734132</u>		Signature: 		
Scale: <u>Urban</u>		Time: <u>9:00</u>		
Particulate Monitors				
	PM 2.5	PM 2.5 Collocated	PM10	TEOM
Probe Inlet Height (IH) (m)	<u>4.5m</u>	/	/	/
Distance to nearest road (m)				
Obstruction Type	<u>Tree</u>			
Obstruction Height (OH) (m)	<u>12.2</u>			
Obstruction Distance (OD) MUST be $\geq(2 \times \text{Obstruction Height} - \text{Probe Height})$ OD $\geq 2 \times (\text{OH} - \text{IH})$				
Collocated distance (m)	<u> </u>			
Unrestricted Airflow (degrees)	<u>280</u>			
Dripline (m)	<u>19.6</u>			
Gaseous Monitors				
	CO	Ozone	NOx	SO2
Probe Inlet Height (IH) (m)	<u>4.5</u>	/	<u>4.5m</u>	/
Distance to nearest road (m)				
Obstruction Type	<u>Tree</u>		<u>Tree</u>	
Obstruction Height (OH) (m)	<u>12.2</u>		<u>12.2</u>	
Obstruction Distance (OD) MUST be $\geq(2 \times \text{Obstruction Height} - \text{Probe Height})$ OD $\geq 2 \times (\text{OH} - \text{IH})$				
Collocated distance (m)	<u> </u>		<u> </u>	
Unrestricted Airflow (degrees)	<u>280</u>		<u>280</u>	
Dripline (m)	<u>19.6</u>		<u>19.6</u>	
Are all probes at least 1 meter apart?	<u>Yes</u>			
Are all probes located in an area that is paved or with vegetative cover?	<u>Yes</u>			
Are all rooftop samplers located at least 2 meters away from any structure?	<u>Yes</u>			
Has your visit been recorded in site logbook?	<u>Yes</u>	Have you taken photos?	<u>Yes</u>	
Unrestricted airflow MUST be greater than 270° Pass/Fail <u>Pass</u>				
Obstruction Distance limit Pass/Fail <u>Pass</u>				
Dripline MUST be at least 10 m away when tree is obstruction Pass/Fail <u>Pass</u>				



5.0 2020 Annual Ambient Monitor Assessment

Assessment date: April 1st, 2020

Site No.	Number of Monitors	Pollutant	Equipment Supplier	Model No. Serial No.	Condition	Years In Service	Monitor Type	Notes
470370011	1	SO ₂	Thermo	43i s/n 1303156453	Good	6	Back-up Monitor	In Air Lab storage room
470370011	1	O ₃	Thermo	49i s/n 09130037	Good	7	SLAMS	At East Health Center
470370011	1	NO ₂	Thermo Instruments	42i s/n 1153030011	Good	8	Back-up Monitor	In Air Lab storage room
470370011	1	Multi-gas Calibrator	Thermo Instruments	146i s/n 0827732246	Good	9	N/A	In Air Lab
470370011	1	Zero Air System	Thermo Instruments	111 s/n 0518112050	Good	9	N/A	At East Health Center
470370011	1	UV Photometer	Teledyne	T703 s/n 220	Good	6	Back-up Ozone Generator	In Air Lab
470370011	1	Data Logger	Agilaire	8832 s/n A4721K	Good	6	N/A	At East Health Center
470370040	1	CO	Thermo Instruments	48i-TLE s/n 1172850016	Good	6	Back-up Monitor	In Air Lab storage room

470370040	1	NO ₂	Thermo Instruments	42i-TL s/n 1324658812	Good	6	SLAMS	At Near Road
470370040	1	PM _{2.5}	Thermo Instruments	2025i s/n 2025i20216204	Good	7	Back-up Monitor	In Air Pollution Cage
470370040	1	Data Logger	Agilaire	8832 s/n A4689K	Good	7	N/A	At Near Road
470370040	1	Multi-gas Calibrator	Thermo Instruments	146i s/n 1324658813	Good	7	N/A	At East Health Center
470370040	1	Zero Air System	Thermo Instruments	111 s/n 1313057860	Good	7	N/A	At Near Road
470370023	1	PM _{2.5}	Thermo Instruments	2025i (POC 1) s/n 2025iW207831504	Good	7	Back-up Monitor	In Air Lab
470370023	1	PM _{2.5}	Thermo Instruments	2025i (POC 2) s/n 2025i202241204	Damaged	7	SLAMS	Damaged by 3/3/2020 Tornado
470370023	1	PM _{2.5}	Thermo	TEOM 1405 s/n 1405A231091503	Damaged	6	SLAMS	Damaged by 3/3/2020 Tornado
470370023	1	PM ₁₀	Thermo	TEOM 1405 s/n 1405A226501311	Damaged	4	SLAMS	Damaged by 3/3/2020 Tornado

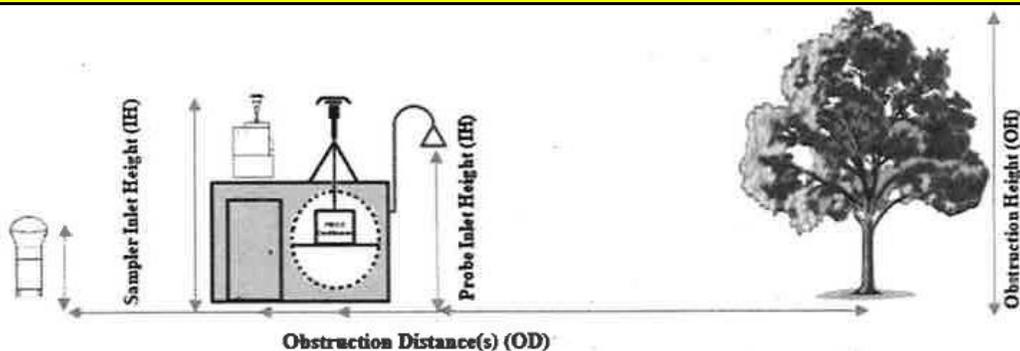
470370023	1	PM _{2.5}	Met One	BAM 1022 s/n T23706	Good	4	Back-up Monitor	In Air Lab storage room
470370023	1	Data Logger	Agilaire	8872 s/n 0221	Damaged	5	N/A	Damaged by 3/3/2020 Tornado
470370026	1	O ₃	Thermo Instruments	49i s/n 1322458652	Good	7	Back-up Monitor	In Air Lab
470370026	1	UV Photometer	Teledyne	703E s/n 296	Good	17	Ozone Generator	In Air Lab for repair
470370026	1	Zero Air System	Thermo Instruments	111 s/n 0827732247	Good	11	N/A	At Percy Priest Dam
470370026	1	Data Logger	Agilaire	8832 s/n A2327K	Good	7	N/A	At Percy Priest Dam
AP Lab	1	PM _{2.5}	Met One	BAM 1022 s/n U16171	New	3	Back-up Monitor	In Air Lab
AP Lab	1	PM _{2.5}	Thermo	TEOM 1405 s/n 1405A238271610	New	3	Back-up Monitor	In Air Lab storage room
AP Lab	1	PM _{2.5}	Thermo Instruments	2025i s/n 2025i202281205	Good	6.5	Back-up Monitor	In Air Pollution Cage
AP Lab	1	O ₃	Thermo Instruments	49i	New	3	SLAMS	At Percy Priest Dam

				s/n 1322458653				
AP Lab	1	Multi-Gas Calibrator	Thermo Instruments	146i s/n 1213752907	Good	7	N/A	At Near Road
AP Lab	1	Zero Air System	Thermo Instruments	111 s/n 1333159730	Good	7	N/A	In Air Lab
AP Lab	1	SO ₂	Thermo Instruments	43i s/n JC1324500911	Good	6	Back-up Monitor	In Air Lab
AP Lab	1	Primary Standard	Thermo Instruments	49iPS s/n 1333159739	Good	7	Primary Standard	In Air Lab storage room
AP Lab	1	Data Logger	Agilaire	8872 s/n 0320	New	4	Back-up Data Logger	In Air Lab storage room
AP Lab	1	NO ₂	Teledyne	T200 s/n 1625	New	4	Back-up Monitor	In Air Lab storage room
AP Lab	1	CO	Teledyne	T300 s/n 1360	Good	4	SLAMS	At Near Road
AP Lab	1	CO	Thermo Instruments	48i s/n 1152990095	New	3	Back-up Monitor	In Air Lab storage room
AP Lab	1	Multi-Gas Calibrator	Teledyne	T750 s/n 61	New	5	PQAO	In Air Lab storage room
AP Lab	1	Multi-Gas Calibrator	EnviroNics	6103	New	6	PQAO	In Air Lab storage room

				s/n 6587				
AP Lab	1	CO	Thermo Instruments	48i-TLE s/n 1324658815	Good	7	Back-up Monitor	In Lab storage room
AP Lab	1	PM _{2.5}	Met One	BAM 1022 s/n W21431	Damaged	2	SLAMS	Damaged by 3/3/2020 Tornado
AP Lab	1	PM _{2.5}	Met One	BAM 1022 s/n W21428	Good	2	SLAMS	At Near Road
AP Lab	1	SO ₂	Thermo	43iQ s/n 1182890005	Good	1	SLAMS	At Near Road
AP Lab	1	Multi-gas Calibrator	Thermo	146iQ s/n 1182890004	New	1	Back-up Monitor	In Air Lab storage room
AP Lab	1	O ₃	Teledyne	T703 s/n 670	New	1	Ozone Generator	At East Health Center
AP Lab	1	O ₃	Teledyne	T703 s/n 671	New	1	Ozone Generator	At Percy Priest Dam

6.0 Appendix A – 2019 Site Evaluation Form

Site Evaluation Form				
Site Name:		Date:		
AQS site no:		Inspected by:		
Coordinates:		Signature:		
Scale:		Time:		
Particulate Monitors				
	PM 2.5	PM 2.5 Collocated	PM10	TEOM
Probe Inlet Height (IH) (m)				
Distance to nearest road (m)				
Obstruction Type				
Obstruction Height (OH) (m)				
Obstruction Distance (OD) MUST be $\geq(2*\text{Obstruction Height} - \text{Probe Height})$				
OD $\geq 2*(\text{OH}-\text{IH})$				
Collocated distance (m)				
Unrestricted Airflow (degrees)				
Dripline (m)				
Gaseous Monitors				
	CO	Ozone	NOx	SO2
Probe Inlet Height (IH) (m)				
Distance to nearest road (m)				
Obstruction Type				
Obstruction Height (OH) (m)				
Obstruction Distance (OD) MUST be $\geq(2*\text{Obstruction Height} - \text{Probe Height})$				
OD $\geq 2*(\text{OH}-\text{IH})$				
Collocated distance (m)				
Unrestricted Airflow (degrees)				
Dripline (m)				
Are all probes at least 1 meter apart?				
Are all probes located in an area that is paved or with vegetative cover?				
Are all rooftop samplers located at least 2 meters away from any structure?				
Has your visit been recorded in site logbook? _____ Have you taken photos? _____				
Unrestricted airflow MUST be greater than 270° Pass/Fail _____				
Obstruction Distance limit Pass/Fail _____				
Dripline MUST be at least 10 m away when tree is obstruction Pass/Fail _____				



7.0 Appendix B – 2020 Tornado Damage at Lockeland Monitoring Site

When the tornado on March 3, 2020 went through East Nashville, Lockeland Elementary lay in its path and the monitoring site there suffered considerable damage. All four monitors and associated equipment were thrown from the roof, with many parts damaged or missing. The roof itself was ripped off the building and is still undergoing repairs. For quality assurance reasons, these sensitive ambient air monitors are no longer operable after sustaining such damage. EPA & TDEC were notified of the damage and are included in discussions for repairing the site. The site is expected to be repaired and returned to fully operational as soon as possible.

Table 7-1 below lists the damaged monitors and associated equipment. The following pictures show the extent of the damage.

Table 7-1 Equipment Damaged by 2020 Tornado

Pollutant Measured	Monitor
PM _{2.5} Primary	MetOne BAM 1022
PM _{2.5} Collocated	Thermo 2025i
PM _{2.5} AQI	TEOM 1405 outdoor shelter, data logger
PM ₁₀	TEOM 1405 outdoor shelter, data logger

Nashville-Davidson County Air Pollution is working to reequip this site. All the equipment that was at the site will have to be replaced. The only change to the previous site set-up that is being made is the replacement of the PM_{2.5} AQI TEOM 1405 and the PM₁₀ TEOM 1405 monitors with a Teledyne T640x. At this time (early May) we have no date for when the site will be online again as repairs to the roof are still ongoing and have been delayed with the COVID-19 pandemic. We aim to have the site collecting data again by mid-summer 2020.

Figure 7-1 Equipment Damaged by 2020 Tornado

Damaged TEOM 1405 monitor&shelter



Damaged TEOM 1405 monitor&shelter



Damaged MetOne BAM 1022 monitor



Damaged Thermo 2025i monitor



Ambient Air Monitoring Plan and 5 Year Network Assessment



KNOX COUNTY --- TENNESSEE HEALTH DEPARTMENT

Prepared by:
Rebecca Larocque

Knox County Air Quality
140 Dameron Avenue
Knoxville, TN 37917-6413

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1.0 Introduction

In 2007, the U.S Environmental Protection Agency (EPA) finalized amendments to the ambient air monitoring regulations. These amendments revised the technical requirements for certain types of monitoring site, programs and analyzers. Monitoring agencies are required to submit annual monitoring network plans and conduct network assessments every five years. Knox County Air Quality is a local monitoring agency operating under a certificate of exemption from the State of Tennessee. The regulations from title 40, part 58, Section 10(1) of the Code of Federal Regulations state that: (40 CFR 58.10 (a)(1))

The state, or where applicable local, agency shall adopt and submit to the Regional Administrator an annual monitoring network plan which shall provide for the establishment and maintenance of an air quality surveillance system that consists of a network of SLAMS monitoring stations including FRM, FEM, and ARM monitors that are part of SLAMS, NCore stations, STN, State speciation stations, SPM stations, and/or in serious, severe and extreme ozone nonattainment areas, PAMS stations, and SPM monitoring stations. The plan shall include a statement of purposes for each monitor and evidence that siting and operation of each monitor meets the requirements of appendices A, C, D and E of this part, where applicable. The annual monitoring network plan must be made available for public inspection for at least 30 days prior to submission to EPA.

And in 40 CFR 58.10 (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 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 for 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.

This document is prepared and submitted to fulfill the requirements of the annual monitoring plan (AMP) and the five year network assessment, as well as provide opportunity for the Knox County Department of Air Quality (Air Quality) to solicit, evaluate and respond to comments and input from the State of Tennessee Department of Environment and Conservation Division of Air Pollution Control (TDEC-APC) and the general public regarding the network. This comprehensive review serves to evaluate whether the current monitoring strategies are meeting the needs of the County, to determine compliance with all current Federal, State, and Local regulations and to aid in the development of future strategies and decisions. It also serves to identify and report the needs for changes within the network and request approval for those changes from US EPA Regional Office

1.1 Scope and Organization

In Knox County, Air Quality operates seven locations where ambient air quality is routinely measured for air pollutants. The measured data provide the public with information on the status of the air quality. Health researchers, business interests, and others can use the data.

As required by the CFR, this document includes equipment, which have federal reference methods

(FRM) or federal equivalent methods (FEM) designations. This agency does not operate any approved regional methods (ARM). The terms FRM and FEM denote monitoring instruments that produce measurements of the ambient pollution concentrations that the regulations allow to be compared to the national ambient air quality standards (NAAQS) for regulator purposes. Also included is information regarding non-regulatory and non-criteria pollutant monitoring.

1.2 Description of Monitoring

The criteria pollutants consist of ozone (O₃), nitrogen dioxide (NO₂), Carbon monoxide (CO), Sulfur dioxide (SO₂), lead (Pb) and particulate matter (PM). Knox County operates stations monitoring for Ozone, Particulate Matter, and Lead. Knox County operates the additional EPA monitoring program for the Chemical Speciation Network (CSN).

The ambient air monitoring network is designed by considering several criteria which meet the monitoring objectives. The primary monitoring objective are monitoring compliance with the NAAQS and providing data to the public in a timely manner. Logistics to be considered in design and continuation of a site include:

- Safety, security, and accessibility
- Cost of site, relocation, maintenance, e.g. fencing, roads, vegetation clearing
- Level footprint for shelter, platforms or concrete pads
- Availability of power and communications
- Meeting pollutant specific location objectives
- Funding
- Staffing
- Proximity to other monitors and statistical relevance of data

During the 5 year network assessment each of these criteria are reevaluated to ensure maximum efficiency while meeting the network objectives. See section 4.0 of this document for the assessment results.

1.3 Climate and Topography

Knox County is located within the Great Valley of East Tennessee. It is paralleled with an elevated plateau to the west and the Great Smoky Mountains to the east. The valley, characterized by long, narrow ridges, flanked by broad valleys, contains slopes from 700 to 1,500 feet above sea level. The highest peak is 2,064 ft above sea level located in the northeast quadrant. This topography is relevant in monitoring plans due to the influence on inversion events. Additionally topography can drive pollutants levels with considerations of contributors and recipients of transport pollutants.

Knox County temperatures fall within the humid subtropical climate zone. Temperature is variable due to elevation between valleys and peaks as well as the surrounding plateau and mountains. In the valley summers are hot and humid, with the average high temperature in July of 88° F. East Tennessee averages cooler than Middle or West Tennessee. The average January low is 28 ° F. The average precipitation for the year is 57 inches with 51 in rain, 6 in snow. Weather data gathered from the National Oceanic and Atmospheric Administration (NOAA)

The wind rose for the last five years indicates the winds continue to alternate between blowing from the southwest to blowing from the northeast. Figures 1.1 and 1.2 below are wind roses run at the Knoxville McGhee Tyson Airport located in Blount County, and the Oak Ridge location in Anderson County. Each of these locations are located within the Knoxville metropolitan statistical area. Wind rose developed using the cli-MATE tools provided by the Midwestern Regional Climate Center.

KNOXVILLE MCGHEE TYSON AP (TN) Wind Rose

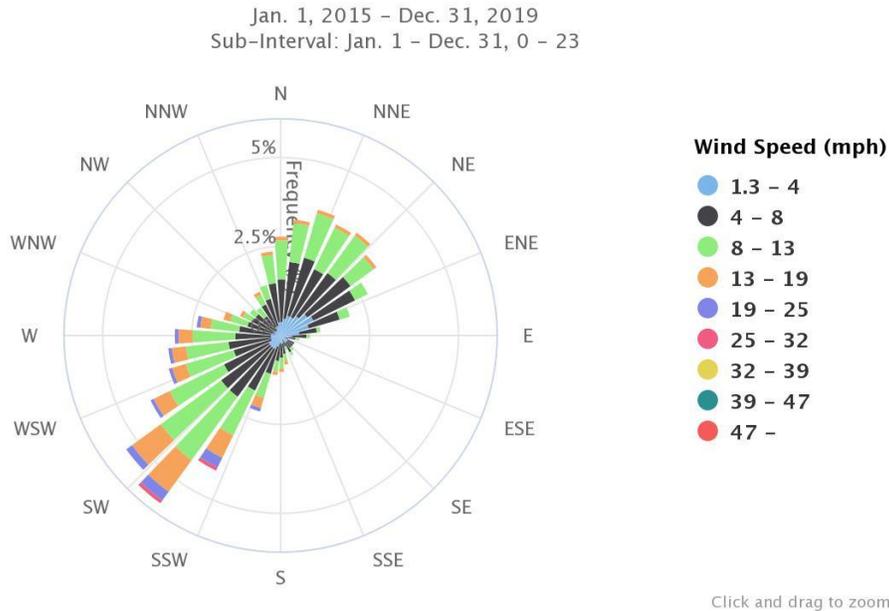


Figure 1.1 Wind Rose Knoxville

OAK RIDGE ASOS (TN) Wind Rose

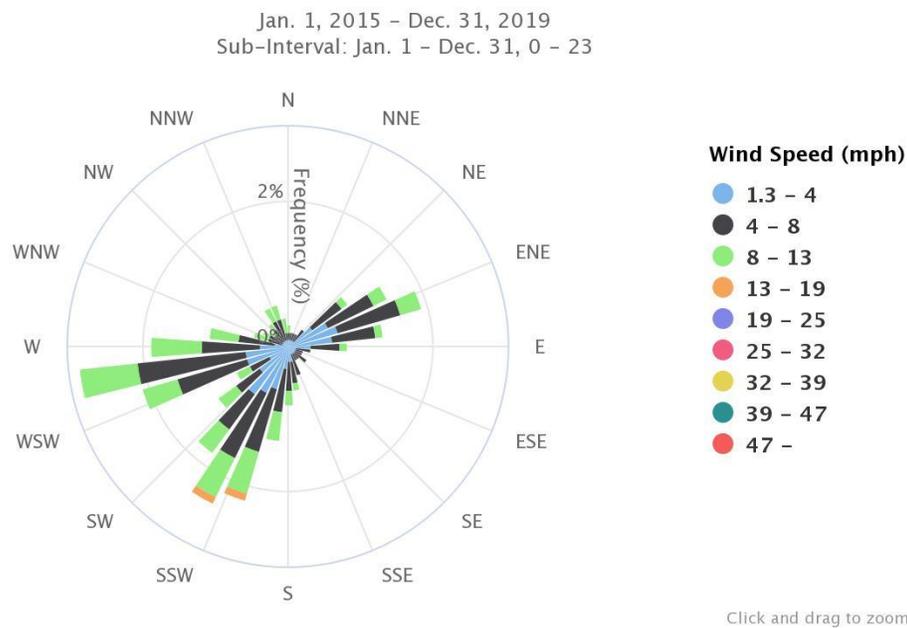


Figure 1.2 Wind Rose Oak Ridge

1.4 Population

The population for Knox County has been increasing, with a variable growth rate around 0.70%. Air monitoring network design considers two different population data metrics. The Core Based Statistical

Area (CBSA) and the Metropolitan Statistical Area (MSA). The Knoxville CBSA, defined by the Office of Management and Budget, consists of Anderson, Blount, Campbell, Grainger, Knox, Loudon, Morgan, Roane and Union Counties. The Knoxville MSA was updated in 2013 to include the same 9 counties as the CBSA. Air Quality works in conjunction with the State of Tennessee for meeting the area monitoring objectives. Figure 1.3 below illustrates the population density of Knox County in persons per square mile. American Community Survey extrapolation for 2017 data produced this illustration. The zip code area of 37916 was intentionally left blank due to the University of Tennessee dormitories causing evaluation distortion.

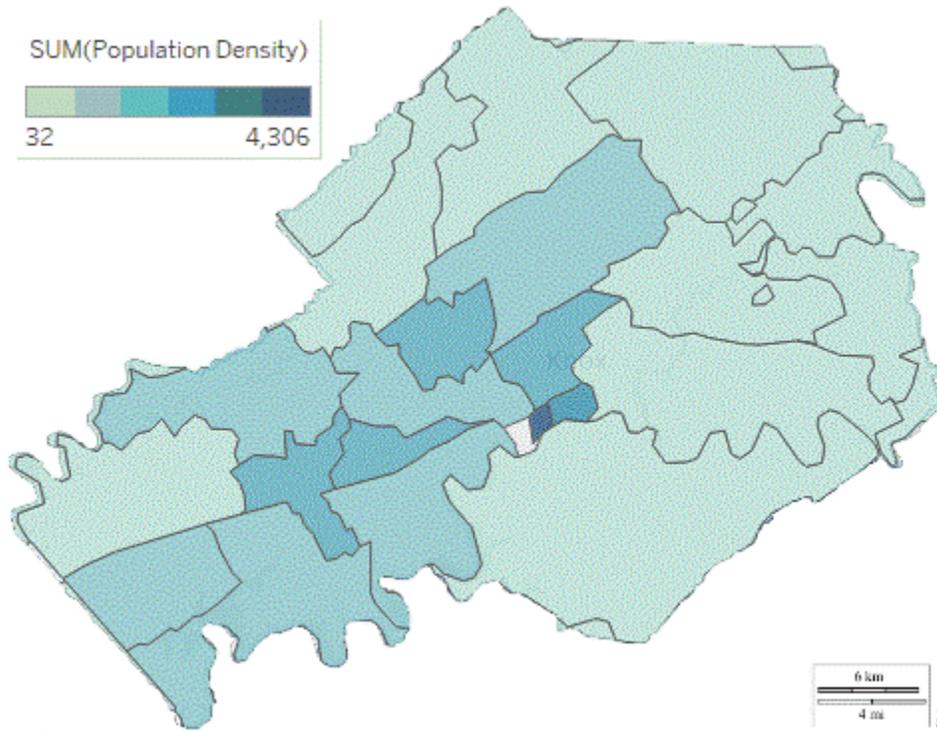


Figure 1.3 Knox County Population Density

Table 1.4 below details the estimated population change over the 2014-2018. The American Community Survey and the Population Estimate Program, both part of the US Census Bureau, perform population estimates

Table 1.4 Population Estimates

Geographic Area	April 1, 2010		Population Estimates (July 1)				
	Census	Estimates	2015	2016	2017	2018	2019
Anderson County,	75,129	75,082	75,456	75,528	76,056	76,287	76,978
Blount County	123,010	123,098	126,954	128,264	129,999	131,331	133,088
Campbell County	40,716	40,723	39,772	39,784	39,791	39,795	39,842
Grainger County	22,657	22,656	22,848	23,095	23,106	23,137	23,320
Knox County	432,226	432,260	451,297	456,089	461,565	466,258	470,313
Loudon County	48,556	48,561	50,916	51,373	52,260	53,082	54,068
Morgan County	21,987	21,986	21,494	21,741	21,555	21,534	21,403
Roane County	54,181	54,208	52,770	52,944	53,020	53,258	53,382
Union County	19,109	19,107	19,159	19,219	19,399	19,689	19,972

Knoxville MSA Totals	837,571	837,681	860,666	868,037	876,751	884,371	892,366
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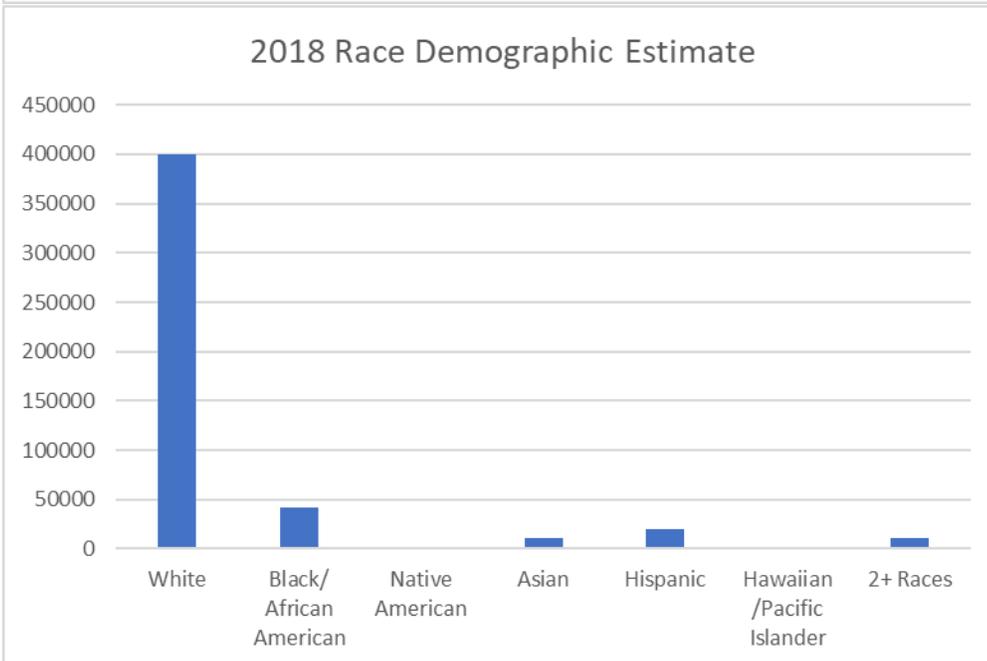
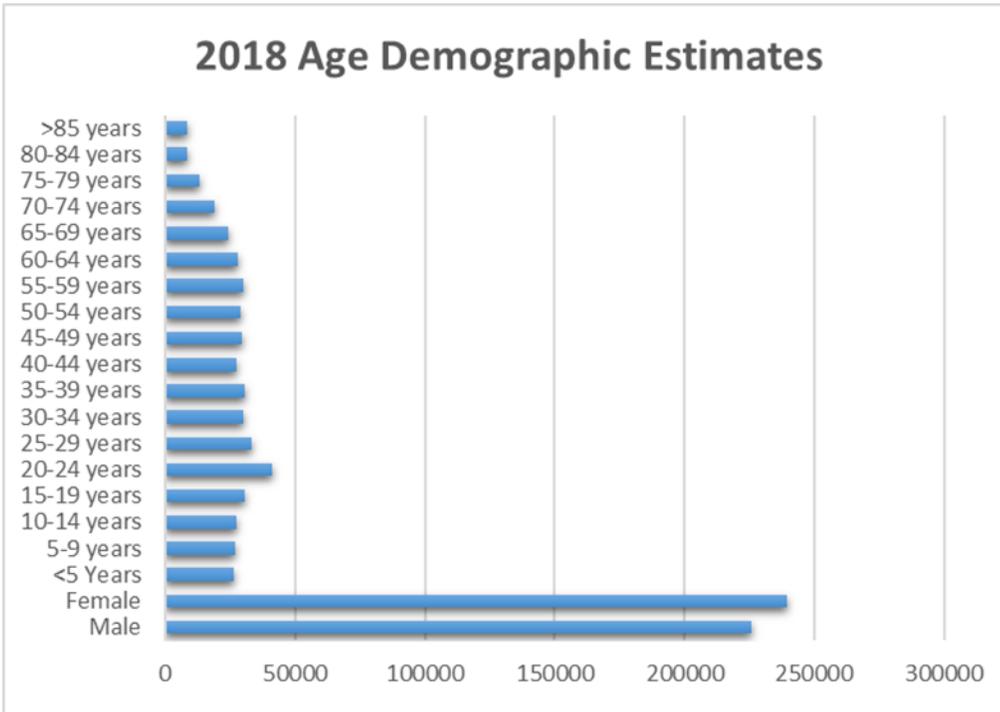


Figure 1.5 Knox County Demographics

2.0 Monitoring Network

The term ‘ambient air’ is defined in 40 CFR 50.1 as “that portion of the atmosphere, external to buildings, to which the general public has access.” Federal rules implemented by the USEPA require

each state to establish a network of monitors to measure concentrations of criteria pollutants in ambient air based upon population, regional air quality, and regulatory concerns. There are 7 monitoring sites operated in Knox County that collect criteria pollutant data. (Table 2.1 and Figure 2.2). A fundamental purpose of air monitoring is to distinguish between areas where pollutant levels exceed the ambient air quality standards and areas where those standards are not exceeded. Health-based ambient air quality standards are set at levels that preclude adverse impacts to human health. Air Quality develops strategies and regulations to achieve the emission reductions necessary to meet all health-based standards. Data from the ambient monitoring network are then used to indicate the success of the regulations and control strategies in terms of the rate of progress towards attaining the standards or to demonstrate that standards have been attained and maintained.

Table 2.1 Station Identification

Station Name	Address	Latitude/Longitude	AQS ID
Air Lab	939 Stewart St	35.980756,-83.925802	47-093-1013
Ameristeel	1526 New York Ave	35.98102,-83.9544	47-093-0023
Bearden	1000 Francis St	35.94195,-84.035	47-093-0028
Burnside	2522 Burnside St	35.98306,-83.9523	47-093-0027
East Knox	9315 Rutledge Pike	36.0855,-83.7649	47-093-0021
Rule	1613 Vermont Ave	35.97773,-83.9504	47-093-1017
Springhill	4711 Mildred Dr.	36.01914,-83.8739	47-093-1020

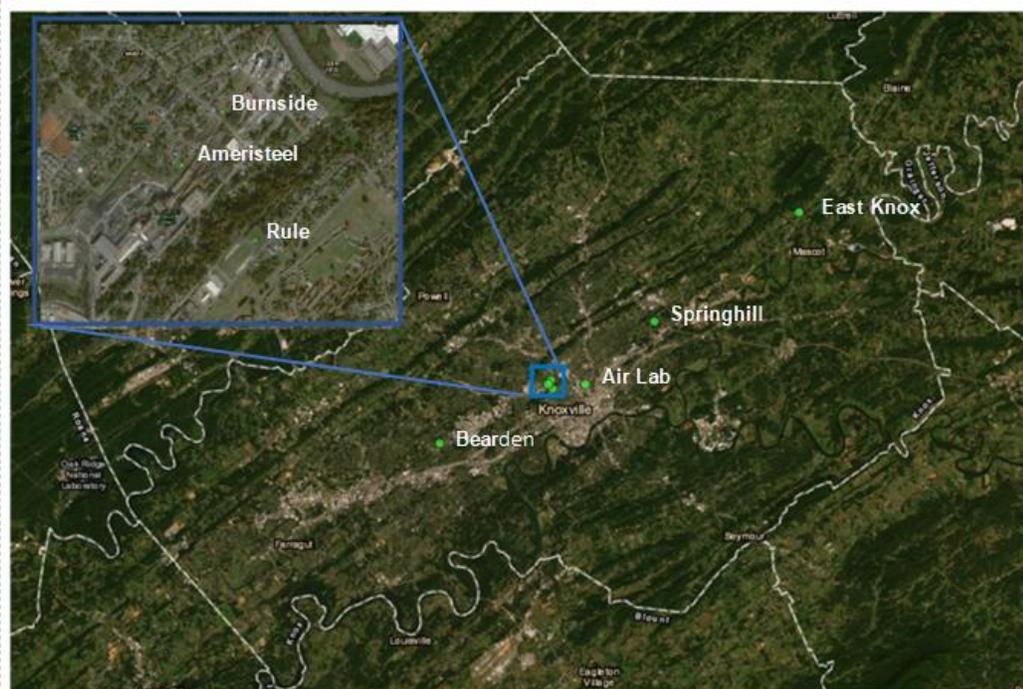


Figure 2.2 Satellite View of Monitoring Stations

2.1 Ozone (O3) Monitoring

Ambient level Ozone is sampled on a continuous basis from March – October at 2 sites in Knox county

and referenced to the NAAQS ozone standard. The minimum number of ozone monitors required by 40 CFR Part 58, appendix D is summarized in Table 2.3 below.

Table 2.3 Minimum O₃ Requirements ⁽¹⁾

Metropolitan Statistical Area (MSA) population ^(2,3)	Number of Monitors per MSA	
	Most recent 3-year design value ≥85% of NAAQS ⁽⁴⁾	Most Recent 3-year design value <85% of NAAQS ^(4,5)
>10 million	4	2
4-10 million	3	1
350,000- < 4 million	2	1
50,000-349,999 ⁽⁶⁾	1	0

- (1) From table D-2 of Appendix D to 40 CFR Part 58
- (2) Minimum monitoring requirements apply to the (MSA)
- (3) Population based on latest available census figures.
- (4) O₃ NAAQS levels are defined in 40 CFR part 50
- (5) Minimum monitoring requirements apply in absence of a design value
- (6) MSA defined as urbanized area of 50,000 or more population.

According to the 2010 Census and the extrapolated US Census Bureau’s Population Estimate Program, the Knoxville MSA falls within the 350,000-<4million population category. Knox County operates ozone monitoring sites at Springhill Elementary (47-093-1020) and East Knox Elementary (47-093-0021). Table 2.4 summarizes the 8-hour O₃ values measured at the monitoring sites during the designated ozone season (March-October) of 2019. Both sites are within 85% of the current NAAQS of .070 ppm.

Table 2.4 Ozone Concentrations 2019

Station	Concentrations			Design Value 2019	NAAQS	Is Design Value ≥ 85% of NAAQS
	Minimum	Maximum	Average			
East Knox	0.014	0.083	0.049	0.063	0.070	Yes
Springhill	0.009	0.072	0.047	0.063	0.070	Yes

The monitoring directives in 40 CFR Appendix D Section 5 contain specific requirements for the operation of Photochemical Assessment Monitoring Stations (PAMS) in areas classified as serious, severe, or extreme nonattainment for O₃. Knox County does not contain any O₃ nonattainment areas, therefore no PAMS monitoring is required in Knox County.

2.2 Carbon Monoxide (CO) Monitoring

Per 40 CFR 58 Appendix D Section 4.2, the requirements for CO monitoring sites are closely related to the requirements for near-road NO₂ monitoring sites (see Section 2.3). Table 2.5 below summarizes the number of required CO monitoring sites.

Table 2.5 CO Monitoring Requirements

Criteria	Number of Near-Road CO Monitors Required
CBSA ≥ 1,000,000	One, collocated with an NO ₂ monitor or in an alternative location approved by the EPA

--	--

2.3 Nitrogen Dioxide (NO₂) Monitoring

The minimum number of NO₂ monitoring sites required by 40 CFR 58 Appendix D Section 4.3 is summarized in Table 2.6.

Table 2.6 Minimum NO₂ Monitoring Requirements ⁽¹⁾

Requirement Type	Criteria	Minimum Monitors Required
Near road	CBSA Population ≥ 1,000,000	1
	CBSA Population ≥ 2.5 Million	2
	CBSA Population ≥ 1,000,000 and Road Segments with annual average daily traffic counts ≥ 250,000	2
Area- Wide	CBSA Population ≥ 1,000,000	1
Protection of Susceptible and Vulnerable Populations	Any area inside or outside CBSAs	As required by EPA Administrator ⁽²⁾

⁽¹⁾ From 40 CFR 58 Appendix D Section 4.3

⁽²⁾ From 40 CFR 58 Appendix D Section 4.3.4 (b)

As documented in Section 1.4 of this document, the Knoxville CBSA does not meet the listed criteria, therefore none are required. There are no NO₂ monitors in Air Quality’s monitoring program.

2.4 Sulfur Dioxide (SO₂) Monitoring

The EPA criteria used to determine the numbers of required SO₂ monitors is based upon two metrics: The Core Based Statistical Area (CBSA), and the Population Weighted Emissions Index (PWEI). The emissions are based upon the most current emissions inventory calculations. The largest emission sources for SO₂ in the CBSA lays outside the county. Therefore, the evaluation of need is left up to TDEC. Using the 2017 emissions data provided by the State of Tennessee and the 2019 population estimate the Knoxville CBSA is not required to have SO₂ monitoring based on these metrics. The Knoxville CBSA PWEI can be calculated as follows:

Knoxville CBSA 2018 census estimate: 892,366
 2017 SO₂ Emissions (tones per year): 3436.33
 PWEI= (892,366*3436.33)/1,000,000 = 3066.46

There are no SO₂ monitors located in Knox County.

2.5 Lead (Pb) Monitoring

The lead monitoring design rule in 40 CFR 58 Appendix D Section 4.5 requires monitoring agencies to establish monitoring near industrial facilities that emit more than 0.5 tons per year (tpy) of lead into the

atmosphere, and at specified airports. None of the listed airports are located in Knox County, but one facility reports annual lead emissions in excess of the 0.5 tpy emissions threshold. The Commercial Metals Company (CMC) plant (formerly Gerdau) reported total lead emissions of 0.525 tons for calendar 2019. The value exceeds the 0.5 tpy monitoring threshold. Air Quality operates 2 lead monitoring sites surrounding the plant which includes one collocated site. The Ameristeel site (47-093-0023) is the source-oriented site required by the rule. This site was established to provide data at the fence line of the plant. The Burnside site (47-093-0027) contains an official and collocated monitor. It was the source specific monitor until 2011 when replaced by the Ameristeel site. Air Quality has continued to operate the Burnside site (47-093-0027) for additional population exposure data. Air Quality is requesting the discontinuing of the Burnside Site, and moving the collocated monitor to Ameristeel, as soon as the Ameristeel site is prepared for the additional monitoring space. Please refer to section 5.1 for all required documentation and statistics on site removal.

2.6 Particulate Matter (PM10) Monitoring

The minimum number of PM10 monitoring sites required by 40 CFR 58 Appendix D Section 4.6 is shown in Table 2.7.

Table 2.7 Minimum PM₁₀ Monitoring Requirements ⁽¹⁾

Population Category	Number of Monitors per MSA ⁽¹⁾		
	High Conc. ⁽²⁾	Medium conc. ⁽³⁾	Low conc. ⁽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⁾ From Table D-4 of Appendix D to 40 CFR Part 58. Selection of urban areas and number of stations per MSA within ranges shown are jointly determined by EPA, TDEC, and Air Quality

⁽²⁾ High concentration areas are those for which data exceeds the NAAQS by 20 % or more

⁽³⁾ Medium concentration areas are those for which data exceeds 80% of the NAAQS

⁽⁴⁾ Low concentration areas are those for which data is less than 80% of the NAAQS

⁽⁵⁾ Low concentration requirements apply in the absence of a design value.

The Knoxville MSA is a low concentration 500,000-1,000,000 population category requiring 1-2 monitor. Air Quality operates one continuous monitor, the APTI-T640x.

2.7 Fine Particulate Matter (PM_{2.5}) Monitoring

The minimum number of PM_{2.5} monitoring sites required by 40 CFR 58 Appendix D Section 4.7 is shown in Table 2.8. In addition to the minimum number of primary monitors required in the network, 40 CFR part 58 appendix A requires *“For each distinct monitoring method designation (FRM or FEM) that a PQAQO is using for a primary monitor, the PQAQO must have 15 percent of the primary monitors of each method designation collocated (values of 0.5 and greater round up); and have at least one collocated quality control monitor (if the total number of monitors is less than three). The first collocated monitor must be a designated FRM monitor”*

Table 2.8 Minimum PM_{2.5} Monitoring Requirements ⁽¹⁾

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

⁽¹⁾ From Table D-5 of appendix D to 40 CFR Part 58.

⁽²⁾ Population based on latest available census figures.

⁽³⁾ Minimum monitoring requirements apply in absence of design value

The NAQSS primary standard for the annual mean and the 24-hour average is taken from a 3-year average based upon the population data and most recent design values, the Knoxville MSA is required to operate 1 primary and 1 collocated PM_{2.5} monitors. Air Quality operates 6 SLAMS monitors which include 4 primary monitors, a collocated monitor and 1 continuous monitor for Air Quality Index (AQI) reporting. Air Quality is working on transitioning to a continuous monitoring method for primary monitors. Sections 4.0 and 5.0, of this document, further discusses evaluation of the network and the requested transition plan. Table 2.9 gives the 2019 design values by site.

Table 2.9 PM_{2.5} NAAQS Comparisons

Site	NAAQS Design Values($\mu\text{g}/\text{m}^3$)	
	24 hour	Annual
Air Lab	16	7.7
Bearden	16	8.0
Rule	19	8.5
Springhill	16	7.5

Additionally, Section 4.7.2 of 40 CFR Part 58 Appendix D requires that agencies operate continuous analyzers in at least one-half of the required PM_{2.5} monitoring sites and at least one analyzer per MSA must be collocated with a sequential Federal Reference Method (FRM) analyzer. Air Quality operates an API- T640X FEM analyzer collocated with an FRM at the Air Lab site to meet the continuous requirement.

2.8 Chemical Speciation

The PM_{2.5} monitoring criteria in 40 CFR 58 Appendix D Section 4.7.4 requires that each state continue to conduct PM_{2.5} Chemical Speciation monitoring at locations designated to be part of the National Speciation Trends Network (STN). Air Quality operates one of these speciation sites at Springhill Elementary (47-093-1020).

2.9 National Core Monitoring (NCore)

Section 3 of Appendix D to 40 CFR part 58 requires that each state operate at least one NCore multi-pollutant monitoring site. By definition, each NCore site must include monitoring equipment to measure PM_{2.5}, PM_{10-2.5}, speciated PM_{2.5}, O₃, SO₂, CO, NO, NO_x, lead, and basic meteorology. Knox County is

not a chosen NCore site within the State of Tennessee.

3.0 Monitoring Sites

The following section shall detail the individual sites within the monitoring network, including location, equipment, pollutants monitored and most recent siting evaluation.

3.1 Air Lab

Figure 3.1 Air Lab Site Photo



The Air Lab site is a particulate site, located in the city limits of Knoxville, in a mixed-use zoning area. It is surrounded by residential and commercial facilities. The Teledyne T640X light scattering monitor is used for reporting the Air Quality Index (AQI).

Address	939 Stewart St, Knoxville 37917	
AQSID	470931013	
Latitude	35.980756N	
Longitude	83.925769W	
Pollutant	PM 2.5	PM 2.5/ PM 10
Parameter Code	88101	88101, 81102
Monitor Type	SLAMS	SLAMS
POC	1	3,4
Interval	24-Hour	24-Hour
Collection Frequency	1:6	Hourly
Method	145	238,239
FRM/FEM Monitoring Instrument	Thermo Partisol Plus 2025	Teledyne T640X
Analysis	Gravimetric	Light Scattering
Ref Method ID	RFPS-0498-118	EQPM-0516-238 EQPM-0516-239
Monitor Objective Type	Population Exposure	Population Exposure
Dominant Source	Mobile	Mobile
Measurement Scale	Middle Scale	Middle Scale
Land Use Type	Mobile	Mobile
Location Setting	Urban and City Center	Urban and City Center
Date Established	20110101	20171001

Table 3.2 Air Lab Monitoring Details



Siting Evaluation Form

Site Name: Air Lab
AQSNo: 47-093-1013
Coordinate 35.980756, -83.925802

Date: 3/12/2020
Site Address: 939 Stewart St
Inspected by: Rebecca Larocque

Pollutant	Scale	Probe Height ¹	Flow (hi or Low)	Separation from samplers ¹	Pass/Fail	Distance to Road ¹	Pass/Fail
PM2.5 filter based	Middle	4.6	low	1.7	Pass	15.3	Pass
PM 2.5/10 continuous	Middle	4.8	low			15.8	Pass

Obstruction type ²	Obst. Height ¹	Obst. Distance ^{1,2}	Pass/Fail	Tree	
				Dripline ¹	Pass/ Fail
Closest Tree (E)	15M	25M	Pass	17.5M	Pass

¹ All Measurements in meters
² Including vertical and horizontal separation from walls &/or parapets if applicable

Collocated Samplers must be within 4 m of each other and at least 2 m apart for hi vol, at least 1 m for low volume
Obstruction Distance must be $\geq 2 \times$ (Obst height - probe height)
Tree Dripline must be >10 m away, prefer >20 m
Horizontal and vertical distance on rooftop 1m for O₃ gases - 2m for all others
Unrestricted air flow must be $\geq 270^\circ$



Siting Evaluation Form

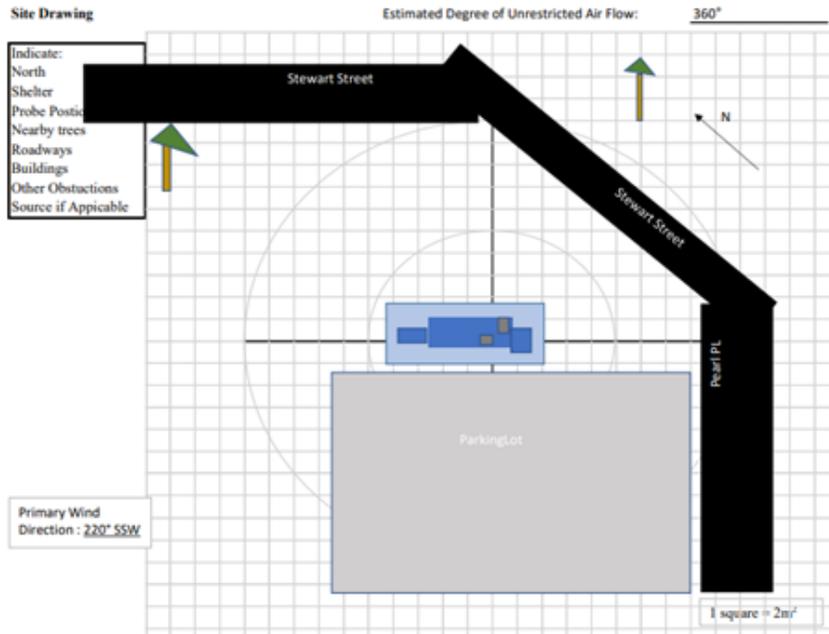


Figure 3.3 Air Lab Site Evaluation pgs 1 & 2



Siting Evaluation Form

Photos facing out from monitor to cardinal direction

North



South



East



West



3 of 5

Siting Evaluation Form
Rev 1, 02/10/2020



Siting Evaluation Form

Photos from cardinal direction facing in towards monitor

North



South



East



West



4 of 5

Siting Evaluation Form
Rev 1, 02/10/2020

Figure 3.4 Air Lab Site Evaluation pg 3 & 4



Figure 3.5 Air Lab Site Eval. pg 5

3.2 Ameristeel

Figure 3.6 Ameristeel Site Photo



This is a lead only site established as a source-oriented site to fulfill the requirements in 40 CFR part 58 App. D 4.5. It is located in the urban core, downwind of the source.

Address	1526 New York Ave, 37921
AQSID	470930023
Lat	35.981
Lon	-83.9543
Pollutant	Lead
Parameter Code	14129
Monitor Type	SLAMS
POC	1
Interval	24-hour average
Collection Frequency	1:6
Method	193
FRM/FEM Monitoring Instrument	High Volume PB-TSP
Analysis	ISP Mass Spectroscopy
Ref Method ID	RFLA-0813-813
Monitor Objective Type	Source Oriented
Dominant Source	Point
Measurement Scale	Null
Land Use Type	Residential
Location Setting	Urban Center
Date Established	20110101

Table 3.7 Ameristeel Monitoring Details



Siting Evaluation Form

Site Name: Ameristeel
 AQSNo: 47-093-0023
 Coordinates: 35.98102, -83.9544

Date: 3/12/2020
 Site Address: 1526 New York Ave
 Inspected by: Rebecca Larocque

Pollutant	Scale	Probe Height ¹	Flow (hi or Low)	Separation from samplers ¹	Pass/Fail	Distance to Road ¹	Pass/Fail
Lead	Microscale	4.8M	Hi	N/A		12.8M	Pass

Obstruction type ²	Obst. Height ¹	Obst. Distance ^{1,2}	Pass/Fail	Tree	
				Dripline ¹	Pass/ Fail
Small trees NNE	4.8M	12.4M	Pass	11M	Pass
Large Tree SW	15.8M	34.4M	Pass	>20M	Pass

¹ All Measurements in meters
² Including vertical and horizontal separation from walls &/or parapets if applicable

Collocated Samplers must be within 4 m of each other and at least 2 m apart for hi vol, at least 1 m for low volume
 Obstruction Distance must be $\geq 2^*$ (Obst height - probe height)
 Tree Dripline must be >10 m away, prefer >20m
 Horizontal and vertical distance on rooftop 1m for O₃ gases - 2m for all others
 Unrestricted air flow must be $\geq 270^\circ$



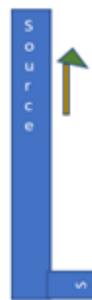
Siting Evaluation Form

Site Drawing

Estimated Degree of Unrestricted Air Flow: 360°

- Indicate:
- North
- Shelter
- Probe Positions
- Nearby trees
- Roadways
- Buildings
- Other Obstructions
- Source if Applicable

Primary Wind Direction : 220° SSW



1 square = 2m²

Figure 3.8 Ameristeel Site Evaluation pgs 1&2



Siting Evaluation Form

Photos facing out from monitor to cardinal direction

North



South



East



West



3 of 5

Siting Evaluation Form
Rev 1, 02/10/2020



Siting Evaluation Form

Photos from cardinal direction facing in towards monitor

North



South



East



West



4 of 5

Siting Evaluation Form
Rev 1, 02/10/2020

Figure 3.9 Ameristeel Site Evaluation pgs 3 & 4



Figure 3.10 Ameristeel Site Eval pg 5

3.3 Bearden

Figure 3.11 Bearden Site Photo



The Bearden site is located west of the urban center of Knoxville in a densely populated area. There are residential and commercial properties for a few kilometers in all directions. This site is centrally located in the Knoxville MSA area. This site currently serves as a collocated site. This site is requested to be discontinued.

Address	1000 Francis Street, Knoxville, 37909	
AQSID	47090028	
Lat	35.94190	
Lon	-84.03500	
Pollutant	PM 2.5	PM 2.5
Parameter Code	88101	88101
Monitor Type	SLAMS	SLAMS
POC	1	2
Interval	24- hour average	24-hour average
Collection Frequency	1:3	1:6
Method	145	145
FRM/FEM Monitoring Instrument	Thermo Partisol Plus 2025	Thermo Partisol Plus 2025
Analysis	GRAVIMETRIC	GRAVIMETRIC
Ref Method ID	RFPS-0498-118	RFPS-0498-118
Monitor Objective Type	Population Exposure	Population Exposure
Dominant Source	Mobile	Mobile
Measurement Scale	Neighborhood	Neighborhood
Land Use Type	Mobile	Mobile
Location Setting	Suburban	Suburban
Date Established	19990101	20110401

Table 3.12 Bearden Monitoring Details



Siting Evaluation Form

Site Name: Bearden
 AQSNo: 47-093-0028
 Coordinate 35.94195, -84.035

Date: 3/12/2020
 Site Address: 1000 Francis Street
 Inspected by: Rebecca Larocque

Pollutant	Scale	Probe Height ¹	Flow (hi or Low)	Separation from samplers ¹	Pass/Fail	Distance to Road ¹	Pass/Fail
PM2.5	Neighborhood	2.44	Low	2.5	Pass	39.6	Pass
PM2.5 collocate	Neighborhood	2.44	Low			41.5	Pass

Obstruction type ²	Obst. Height ¹	Obst. Distance ^{1,2}	Pass/Fail	Tree	
				Dripline ¹	Pass/ Fail
Tallest Tree ENE	11.2M	20M	Pass	18M	Pass
Tallest Tree S	13.7M	26.4M	Pass	>20M	Pass
Tallest TreeSSW	16M	29M	Pass	>20M	Pass
Tallest Tree NNW	10M	18.4M	Pass	17.2M	Pass

¹ All Measurements in meters
² Including vertical and horizontal separation from walls &/or parapets if applicable

Collocated Samplers must be within 4 m of each other and at least 2 m apart for hi vol, at least 1 m for low volume
 Obstruction Distance must be $\geq 2^*$ (Obst height - probe height)
 Tree Dripline must be >10 m away, prefer >20m
 Horizontal and vertical distance on rooftop 1m for O₃ gases - 2m for all others
 Unrestricted air flow must be $\geq 270^*$



Siting Evaluation Form

Site Drawing

Estimated Degree of Unrestricted Air Flow: 360°

- Indicate:
- North
- Shelter
- Probe Postions
- Nearby trees
- Roadways
- Buildings
- Other Obstructions
- Source if Applicable

Primary Wind Direction : 220° SSW

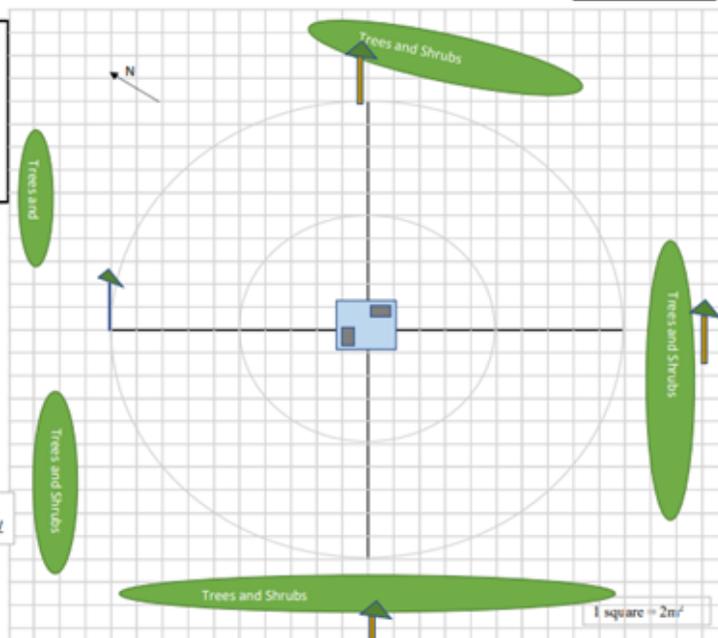


Figure 3.13 Bearden Site Eval pg 1 &2



Siting Evaluation Form

-

Photos facing out from monitor to cardinal direction

North



South



East



West



3 of 5

Siting Evaluation Form
Rev 1, 02/10/2020



Siting Evaluation Form

Photos from cardinal direction facing in towards monitor

North



South



East



West



4 of 5

Siting Evaluation Form
Rev 1, 02/10/2020

Figure 3.14 Bearden Site Eval pg 3 & 4



Figure 3.15 Bearden Site Evaluation pg 5

3.4 Burnside

Figure 3.16 Burnside Site Photo



The Burnside site is located in the Urban Industrial section of the city of Knoxville. The site was established in 1994 and served as a source-oriented lead monitor and collocated monitoring site. The Ameristeel Site is now the source-oriented monitor and the Burnside site serves as a population exposure site. This site is requested to be discontinued and collocation moved to Ameristeel.

Address	2522 Burnside St, 37921	
AQSID	47090027	
Lat	35.98306	
Lon	-83.95226	
Pollutant	Lead	Lead
Parameter Code	14129	14129
Monitor Type	SLAMS	SLAMS
POC	1	2
Interval	24-hour average	24-hour average
Collection Frequency	1:6	1:6
Method	193	193
FRM/FEM Monitoring Instrument	Hi-Vol Pb-TSP	Hi-Vol Pb-TSP
Analysis	ISP Mass Spectroscopy	ISP Mass Spectroscopy
Ref Method ID	RFLA-0813-813	RFLA-0813-813
Monitor Objective Type	Population Exposure	Collocated
Dominant Source	Point	Point
Scale	Neighborhood	Neighborhood
Land Use Type	Industrial	Industrial
Location Setting	Urban and City Center	Urban and City Center
Date Established	19941204	19941204

Table 3.17 Burnside Monitoring Details



Siting Evaluation Form

Site Name: Burnside
 AQSNo: 47-093-0027
 Coordinate 35.98306, -83.9523

Date: 3/12/2020
 Site Address: 2522 Burnside St, 37921
 Inspected by: Rebecca Larocque

Pollutant	Scale	Probe Height ¹	Flow (hi or Low)	Separation from samplers ¹	Pass/Fail	Distance to Road ¹	Pass/Fail
Lead - Official	Neighborhood	2M	Hi	2.56M	Pass	24.0M	Pass
Lead Collocated	Neighborhood	2M	Hi	2.56M	Pass	23.8M	Pass

Obstruction type ²	Obst. Height ¹	Obst. Distance ^{1,2}	Pass/Fail	Tree	
				Dripline ¹	Pass/ Fail
Tree SW quadrant	20	18		10.5	Pass
Firehouse	6.2	26.2	Pass		

¹ All Measurements in meters
² Including vertical and horizontal separation from walls &/or parapets if applicable

Collocated Samplers must be within 4 m of each other and at least 2 m apart for hi vol, at least 1 m for low volume
 Obstruction Distance must be $\geq 2^*$ (Obst height - probe height)
 Tree Dripline must be >10 m away, prefer >20m
 Horizontal and vertical distance on rooftop 1m for O₃ gases - 2m for all others
 Unrestricted air flow must be $\geq 270^{\circ}$



Siting Evaluation Form

Site Drawing

Estimated Degree of Unrestricted Air Flow: 270°

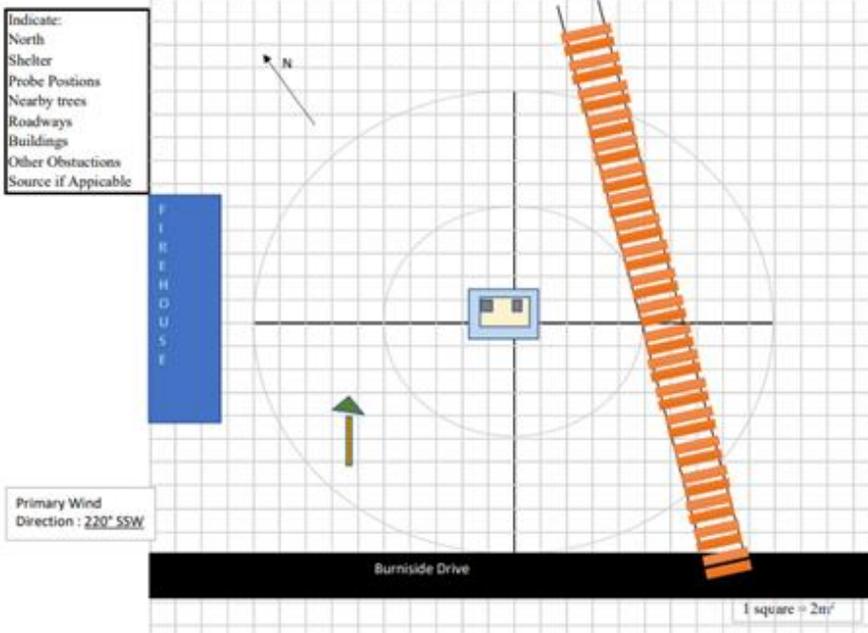


Figure 3.18 Burnside Site Evaluation pgs 1&2



Siting Evaluation Form

Photos facing out from monitor to cardinal direction

North



South



East



West



3 of 5

Siting Evaluation Form
Rev 1, 02/10/2020



Siting Evaluation Form

Photos from cardinal direction facing in towards monitor

North



South



East



West



4 of 5

Siting Evaluation Form
Rev 1, 02/10/2020

Figure 3.19 Burnside Site Evaluation pgs 3&4



Figure 3.20 Burnside Site Eval pg 5

3.5 East Knox

Figure 3.21 East Knox Site Photo



This site is located in East Knox County and currently monitors for ozone. The site was initially established in 1981. The site is located downwind from the core Knoxville MSA area. This site serves in assessing the highest concentration of ozone in the Knoxville area and used in the AQI forecasting program.

Address	9315 Rutledge Pike, Mascot, 37806
AQSID	470930021
Lat	36.08564
Lon	-83.76475
Pollutant	Ozone
Parameter Code	44201
Monitor Type	SLAMS
POC	1
Interval	Hourly
Collection Frequency	Hourly
Method	087
FRM/FEM Monitoring Instrument	Teledyne 400E
Analysis	Ultraviolet
Ref Method ID	EQOA-0992-087
Monitor Objective Type	Highest Concentration
Dominant Source	Null
Measurement Scale	Urban Scale
Land Use Type	Agricultural
Location Setting	Rural
Date Established	19810601

Figure 3.22 East Knox Monitoring Details



Siting Evaluation Form

Site Name: East Knox
 AQSNo: 47-093-0021
 Coordinate 36.0855,-83.7649

Date: 3/16/2020
 Site Address: 9315 Rutledge Pike
 Inspected by: Rebecca Larocque

Pollutant	Scale	Probe Height ¹	Flow (hi or Low)	Separation from samplers ¹	Pass/Fail	Distance to Road ¹	Pass/Fail
Ozone	Urban	4M	Low	n/a		180M	Pass

Obstruction type ²	Obst. Height ¹	Obst. Distance ^{1,2}	Pass/Fail	Tree	
				Dripline ¹	Pass/ Fail
Pine West	18.2M	34.4M	Pass	>20M	Pass
Tallest Pine WSW	18.4M	31M	Pass	>20 M	Pass
Smaller closer brush	5.8M	15M	Pass	13.4	Pass

This site should be monitored for tree growth carefully, keep smaller brush maintained

¹ All Measurements in meters
² Including vertical and horizontal separation from walls &/or parapets if applicable

Collocated Samplers must be within 4 m of each other and at least 2 m apart for hi vol, at least 1 m for low volume
 Obstruction Distance must be $\geq 2^*$ (Obst height - probe height)
 Tree Dripline must be >10 m away, prefer >20m
 Horizontal and vertical disance on rooftop 1m for O₃ gases - 2m for all others
 Unrestricted air flow must be $\geq 270^\circ$

Site Drawing

Estimated Degree of Unrestricted Air Flow: 310

- Indicate:
- North
- Shelter
- Probe Postions
- Nearby trees
- Roadways
- Buildings
- Other Obstructions
- Source if Applicable

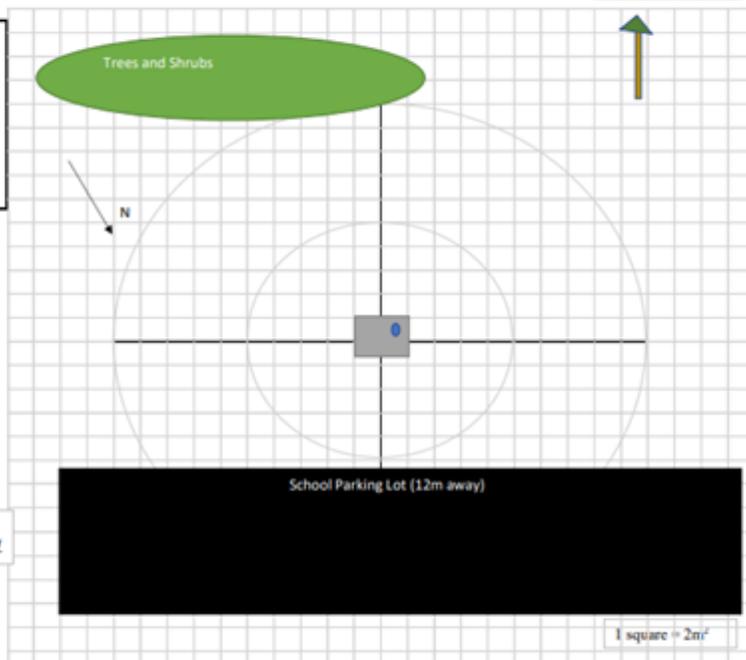


Figure 3.23 East Knox Site Evaluation pgs 1&2



Siting Evaluation Form

Photos facing east from monitor to cardinal direction

North



South



East



West



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Siting Evaluation Form
Rev 1, 02/10/2020



Siting Evaluation Form

Photos from cardinal direction facing in towards monitor

North



South



East



West



4 of 5

Siting Evaluation Form
Rev 1, 02/10/2020

Figure 3.24 East Knox Site Evaluation pgs 3&4



Figure 3.25 East Knox Site Eval pg 5

3.6 Rule

Figure 3.26 Rule Site Photo



The Rule site serves as a population exposure site for PM2.5. The lead monitoring was discontinued in November of 2017 as approved in the 2017 Plan. It is located in a residential area that is less than .5-kilometer SE of several industries.

Address	1613 Vermont Ave, Knoxville, 37921
AQSID	470931017
County	Knox
CBSA	28940
Lat	35.97802
Lon	-83.95067
Pollutant	PM 2.5
Parameter Code	88101
Monitor Type	SLAMS
POC	1
Interval	24-hour average
Collection Frequency	1:3
Method	145
FRM/FEM Monitoring Instrument	Thermo Partisol Plus 2025
Analysis	Gravimetric
Ref Method ID	RFPS-0498-118
Monitor Objective Type	Population Exposure
Dominant Source	Mobile
Measurement Scale	Neighborhood
Land Use Type	Residential
Location Setting	Urban and Center city
Date Established	20020101

Figure 3.27 Rule Monitoring Details



Siting Evaluation Form

Site Name: Rule
 AQSNo: 47-093-1017
 Coordinate 35.97773, -83.9504

Date: 3/12/2020
 Site Address: 1613 Vermont Ave
 Inspected by: Rebecca Laroque

Pollutant	Scale	Probe Height ¹	Flow (hi or Low)	Separation from samplers ¹	Pass/Fail	Distance to Road ¹	Pass/Fail
Pm2.5	Neighborhood	2.36M	Low	n/a		>42M	Pass

Obstruction type ²	Obst. Height ¹	Obst. Distance ^{1,2}	Pass/Fail	Tree	
				Dripline ¹	Pass/ Fail
Water Tower	23.4M	69.8M	Pass		
Tallest tree W	9.2M	32M	Pass	>20M	Pass

¹ All Measurements in meters
² Including vertical and horizontal separation from walls &/or parapets if applicable

Collocated Samplers must be within 4 m of each other and at least 2 m apart for hi vol, at least 1 m for low volume
 Obstruction Distance must be $\geq 2 \times$ (Obst height - probe height)
 Tree Dripline must be >10 m away, prefer >20m
 Horizontal and vertical distance on rooftop 1m for O₃ gases - 2m for all others
 Unrestricted air flow must be $\geq 270^\circ$



Siting Evaluation Form

Site Drawing

Estimated Degree of Unrestricted Air Flow: 360°

- Indicate:
- North
- Shelter
- Probe Postions
- Nearby trees
- Roadways
- Buildings
- Other Obstructions
- Source if Applicable

Primary Wind
Direction : 220° SSW

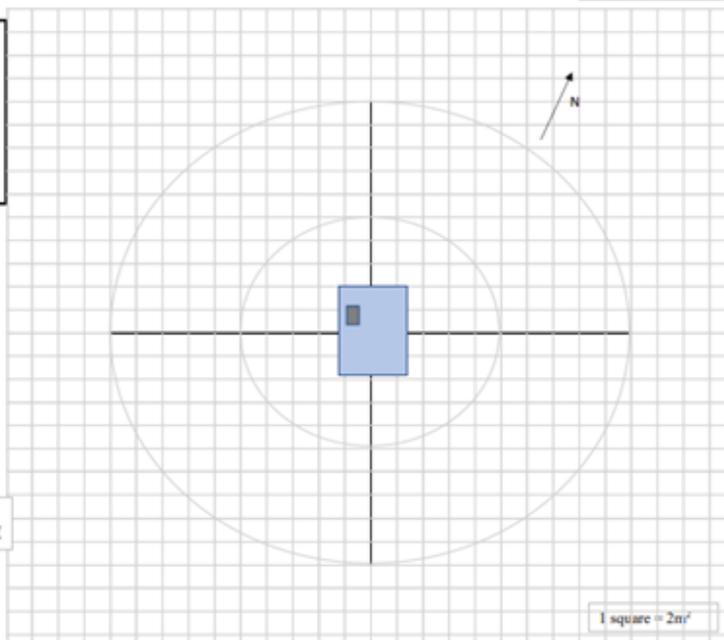


Figure 3.28 Rule Site Evaluation pgs 1&2



Siting Evaluation Form

Photos facing out from monitor to cardinal direction

North



South



East



West



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Siting Evaluation Form
Rev 1, 02/10/2020



Siting Evaluation Form

Photos from cardinal direction facing in towards monitor

North



South



East



West



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Siting Evaluation Form
Rev 1, 02/10/2020

Figure 3.29 Rule Site Evaluation pgs 3&4



Figure 3.30 Rule Site Eval pg 5

3.7 Springhill

Figure 3.31 Springhill Site Photo



The Springhill site is a neighborhood scale site located downwind of the urban core of Knoxville where ozone precursors are likely to occur. This site provides PM speciation information as well as Ozone and PM 2.5.

Address	4711 Mildred Drive, Knoxville, 37914			
AQSID	470931020			
County	Knox			
CBSA	28940			
Lat	36.01920			
Lon	-83.87390			
Pollutant	Ozone	PM 2.5	PM 2.5 speciated	
Parameter Code	44201	88101	88502	88502
Monitor Type	SLAMS	SLAMS	Speciation	Speciation
POC	1	1	5	5
Interval	Hourly	24 Hour Average	24 Hour Average	24 Hour Average
Frequency	Hourly	1:3	1:6	1:6
Method	087	145	810	810
FRM/FEM Monitoring Instrument	Teledyne 400E	Thermo Partisol Plus 2025	Met One Super SASS	URG 3000
Analysis	Ultra Violet	Gravimetric	Gravimetric	Gravimetric
Ref Method ID	EQOA-0992-087	RFPS-0498-145	RFPS-0400-136	RFPS-0400-136
Objective	Population Exposure			
Dominant Source	Mobile			
Measurement Scale	Neighborhood			
Land Use Type	Residential			
Location Setting	Suburban			
Date Established	19810101	19990101		

Figure 3.32 Springhill Monitoring Details



Siting Evaluation Form

Site Name: Springhill
 AQSNo: 47-093-1020
 Coordinate 36.0114, -83.8739

Date: 3/18/2020
 Site Address: 4711 Mildred Drive
 Inspected by: Rebecca Larocque

Pollutant	Scale	Probe Height ¹	Flow (hi or Low)	Separation from samplers ¹	Pass/Fail	Distance to Road ¹	Pass/Fail
Ozone	Neighborhood	4.3	Low	2.1	Pass	36.2	Pass
PM2.5	Neighborhood	4.6	Low	1.3	Pass	37.8	Pass
URG Speciation	Neighborhood	4.6	Low	1.3	Pass	36.2	Pass
SASS speciation	Neighborhood	4.4	Low	1.5	Pass	36.2	Pass

Obstruction type ²	Obst. Height ¹	Obst. Distance ^{1,2}	Pass/Fail	Tree	
				Dripline ¹	Pass/ Fail
Tree NE	16.4	24.6	Pass	19M	Pass
Tallest Pine E	21.6	28		19.4M	Pass

¹ All Measurements in meters
² Including vertical and horizontal separation from walls &/or parapets if applicable

Collocated Samplers must be within 4 m of each other and at least 2 m apart for hi vol, at least 1 m for low volume
 Obstruction Distance must be $\geq 2^*$ (Obst height - probe height)
 Tree Dripline must be >10 m away, prefer >20m
 Horizontal and vertical distance on rooftop 1m for O₃ gases - 2m for all others
 Unrestricted air flow must be $\geq 270^\circ$



Siting Evaluation Form

Site Drawing

- Indicate:
- North
- Shelter
- Probe Postions
- Nearby trees
- Roadways
- Buildings
- Other Obstructions
- Source if Applicable

Primary Wind Direction : 220° SSW

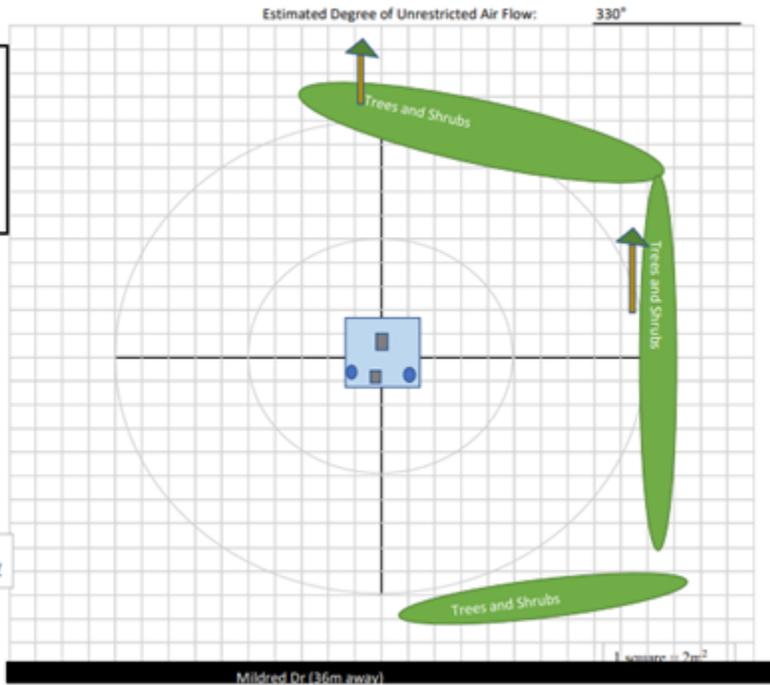


Figure 3.33 Springhill Site Evaluation pgs 1&2



Siting Evaluation Form

Photos facing out from monitor to cardinal direction

North



South



East



West



3 of 5

Siting Evaluation Form
Rev 1, 02/10/2020



Siting Evaluation Form

Photos from cardinal direction facing in towards monitor

North



South



East



West



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Siting Evaluation Form
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Figure 3.34 Springhill Site Evaluation pgs 3&4



Figure 3.35 Springhill Site Eval pg 5

4.0 5-Year Assessment

40 CFR 58.10 (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 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 for 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.

In accordance with 40 CFR Part 58 Appendix D Section 1.1 the SLAMS monitoring networks must be designed to meet three basic monitoring objectives

- Provide air pollution data to the general public in a timely manner
- Support compliance with ambient air quality standards and emission strategy development
- And Support air pollution research studies

In addition, following 40 CFR 58 App D Section 1.1.1, in support of these objectives, sites shall:

- Determine highest concentrations expected to occur in the area
- Determine representative concentrations in areas with high population density
- Determine impact of significant sources or source categories on air quality
- Provide data to TDEC to assist the agency in forecasting air quality.

This 5-year assessment will review the demographics, health characteristics, pollutant statistics and then rate, with in each pollutant network, each site at meeting the objectives.

4.1 Health Status and Demographics Served

Utilizing population demographic information from section 1.4 of this document, climate / topography information from section 1.3, and the asthma and heart disease hospitalization distribution by zip code, each network is evaluated for providing air quality characterizations for the vulnerable populations.

Table 4.1 Demographic Details

Pollutant	AQS ID	Site Name	Zip Code	Area Served (2)	Population Served (1)
Ozone	47-093-0021	East Knox	37806	276 mi ²	55,118
Ozone	47-093-1020	Springhill	37914	353 mi ²	288,359
PM2.5	47-093-1013	Air Lab	37917	49 mi ²	66,568
PM2.5	47-093-0028	Bearden	37909	490 mi ²	275,473
PM2.5	47-093-1017	Rule	37921	107 mi ²	83,989
PM2.5	47-093-1020	Springhill	37914	1093 mi ²	270,497

(1) Based upon US Census 2010 and Population Estimate Program, USCENSUS.GOV

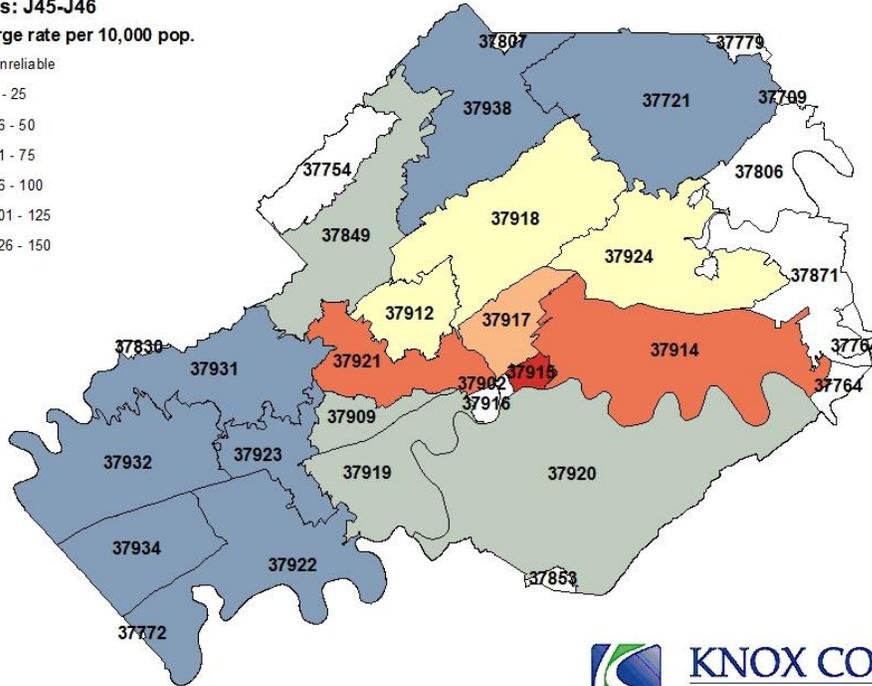
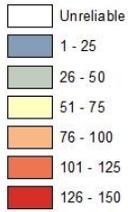
(2) Calculated Theisen Polygons by NetAssess2020 v1.1 USEPA

Area and population served is calculated throughout the CBSA and not limited to within Knox County.

2017 Asthma Inpatient + Outpatient Hospital Discharges

ICD 10s: J45-J46

Discharge rate per 10,000 pop.



2017 Heart Disease Inpatient + Outpatient Hospital Discharges

ICD 10s: I20-I52 (excludes rheumatic heart disease)

Rate per 10,000 pop.

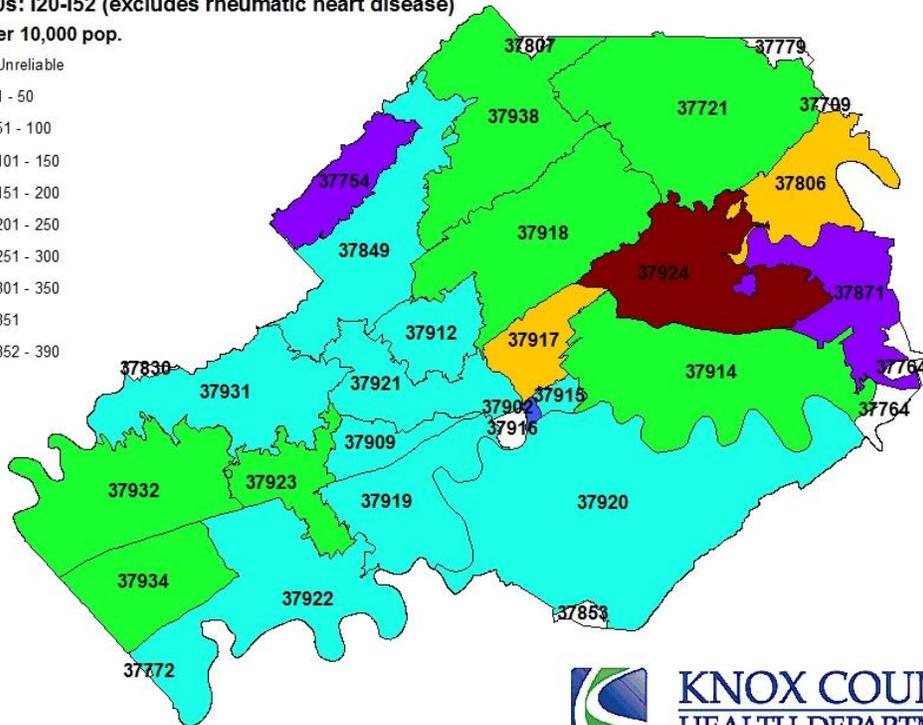


Figure 4.2 Asthma and Heart Disease Distribution

4.2 Data Trends and Statistics

Monitors that have a long historical record are valuable for tracking trends. In this analysis, monitors are ranked based on the duration of their continuous measurement records. The analysis can be as simple as ranking the available monitors based on the length of the continuous sampling record. The most important monitors are those with the longest continuous trend record. Trend charts are composed of design values as reported in USEPA AQS database.

Correlation statistics are produced so that concentrations measured at one monitor are compared to concentrations measured at other monitors to determine if concentrations correlate temporally. Monitor pairs with correlation coefficient values near one are highly correlated and should be ranked lower than those with correlation coefficient values near zero. Monitors that do not correlate well with other monitors exhibit unique temporal concentration variation relative to other monitors and are likely to be important for assessing local emissions, transport, and spatial coverage. Monitors with concentrations that correlate well (e.g., $r^2 > 0.75$) with concentrations at another monitor may be redundant. Correlation calculated using design values reported in USEPA AQS database input into excel Pearson correlation function. Correlation is reviewed for Ozone and $PM_{2.5}$. It is not a useful statistic for lead and PM_{10} networks.

Removal Bias statistics are those which measured values are interpolated across a domain using the entire network. Sites are then systematically removed, and the interpolation is repeated. The absolute difference between a concentration measured at a site and the concentration predicted by interpolation with the site removed is the site's removal bias. Greater bias or uncertainty indicates a more important site for developing interpolations to represent concentrations across a domain. Those sites with low bias may be providing redundant information. Removal Bias is reviewed for Ozone and $PM_{2.5}$. It is not a useful statistic for lead and PM_{10} networks.

4.2.1 Ozone

Both sites in the ozone network have seen a downward trend in both the design value and 4th annual maximum value as an 8-hour value (Figure 4.3 below). This nearly 20-year trend for each site data illustrates that reduction methods have been working. The NAAQS was revised in 2008 and again in 2015.

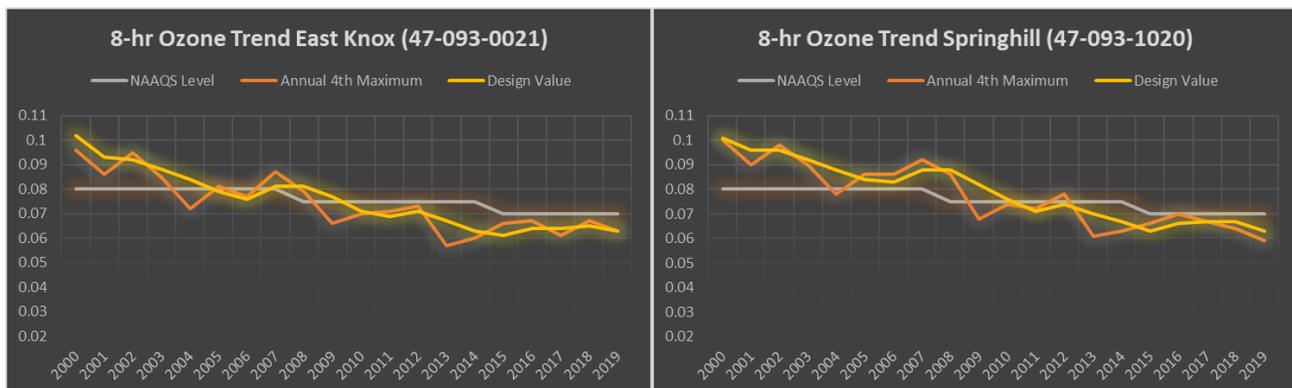


Figure 4.3 8-hr Ozone Trends)

East Knox and Springhill have a correlation between 0.9-1 (Figure 4.4 below). The two sites are highly correlated with each other, (.98) and correlated with the rest of the sites in the CBSA operated by TDEC.

	47-093-0021	47-093-1020	47-001-0101	47-009-0101	47-009-0102	47-005-0109
47-093-0021	1					
47-093-1020	0.9845	1				
47-001-0101	0.9761	0.9715	1			
47-009-0101	0.9838	0.9809	0.9760	1		
47-009-0102	0.9735	0.9437	0.9630	0.9635	1	
47-005-0109	0.9203	0.9461	0.9271	0.9275	0.8353	1
47-089-0002	0.9809	0.9701	0.9857	0.9812	0.96210	0.9266

Table 4.4 Pearson Correlation Matrix Ozone

Similar to the correlation evaluation, the Mean Relative Bias are both <10% (Figure 4.5). This indicates that there would be little to no bias in the data for the area should the site be removed from the calculations.

Site	47-093-0021	47-093-1020
Neighbors Included	4	6
Daily OBS county	723	711
Mean Bias	0.0013ppm	-0.002ppm
Bias Std Deviation	0.0027ppm	0.0032ppm
Minimum Bias	-0.007ppm	-0.012ppm
Maximum Bias	0.008ppm	0.015ppm
Mean Relative Bias	3.3%	1%

Table 4.5 Ozone Removal Bias

4.2.2 Lead

The Burnside site has a much longer data trend, starting in 2003 to present, in source-oriented lead monitoring the site location is much more important to quantifying the pollution levels than long term data trends. The listed purpose of the Burnside monitor is population exposure. The trends data shows 18 years of design values under 50% of the NAAQS standard for this site. The Ameristeel site has 9 years of data illustrating a reduction to below the NAAQS, and continued decline

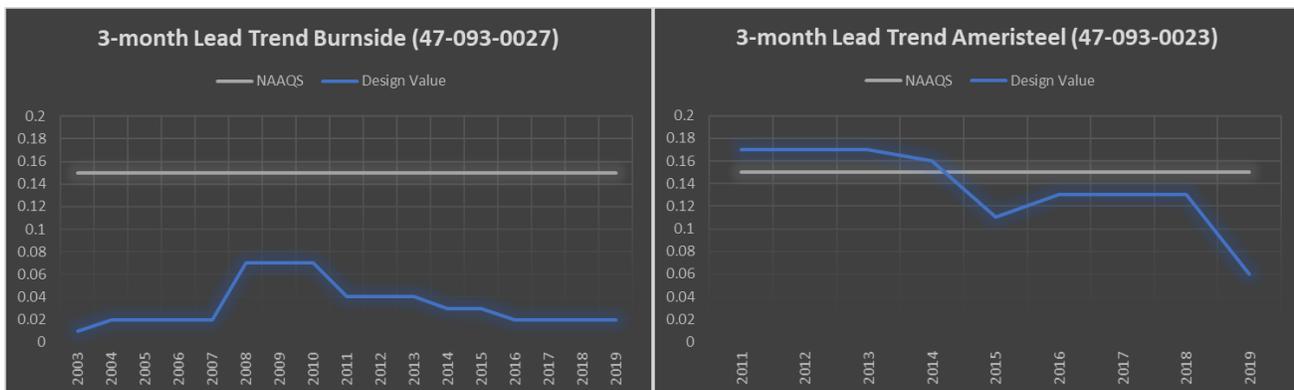


Figure 4.6 3-month Lead Trend Data for Ameristeel and Burnside

Plotting the two sites together (Figure 4.7) illustrates the large difference between the source oriented Ameristeel (47-093-0023) site and the Burnside (47-093-0027) historical site

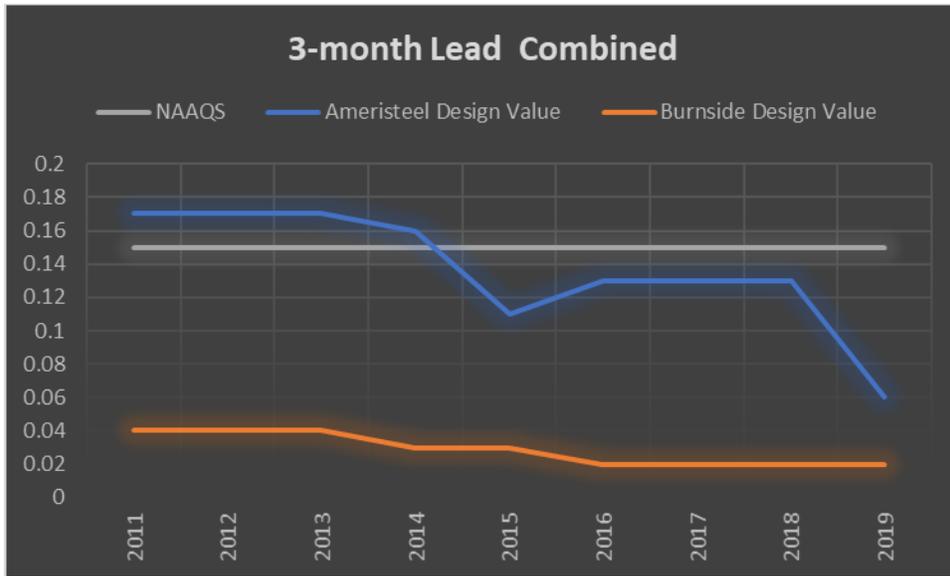


Figure 4.7 3-month Combined Lead Design Value Trends

4.2.3 PM_{2.5}

All PM_{2.5} sites have trends data going back to early 2000's (Figure 49). The NAAQS changed the 24 hr standard in 2006 and the annual design value standard in 2012.

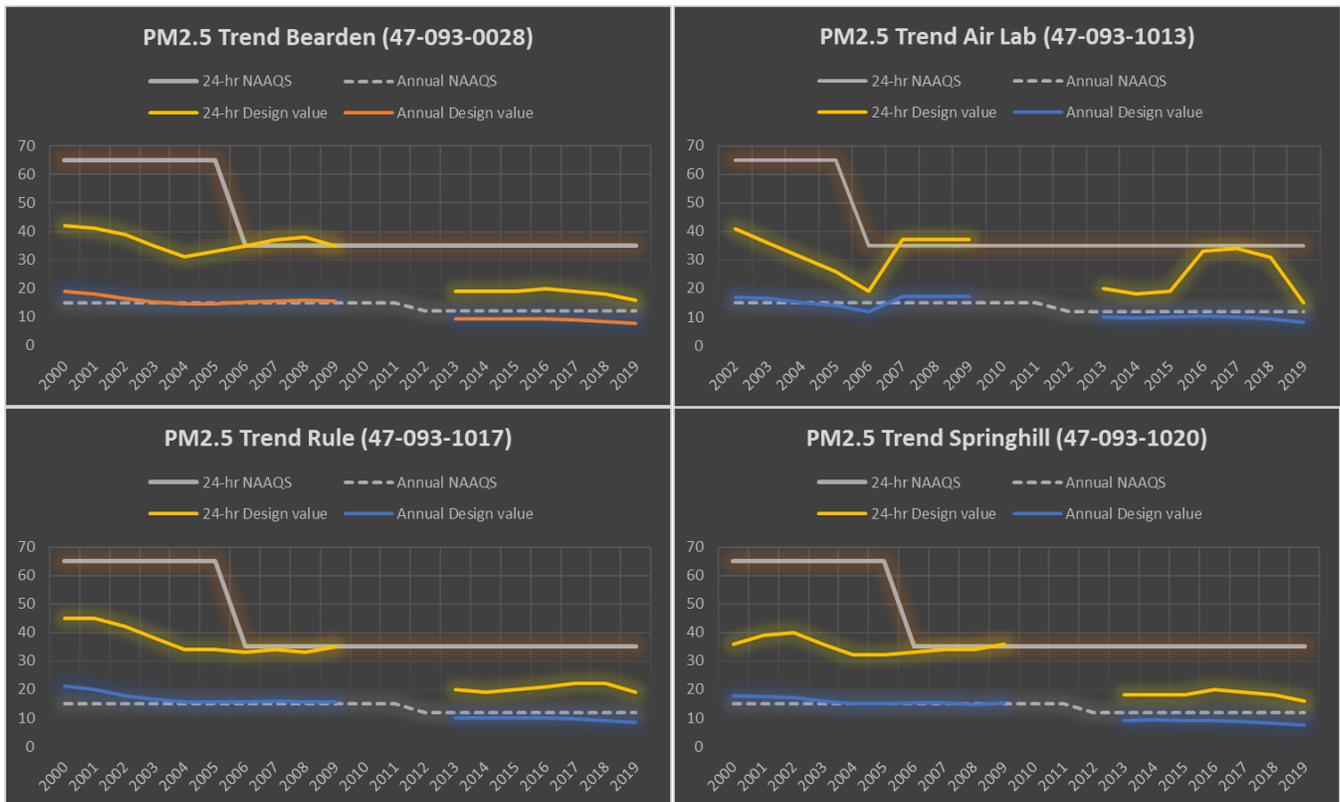


Figure 4.8 PM_{2.5} Trends Data Chart

24 hr correlation

A Pearson correlation matrix was produced for both the 24-hr and annual design values (Tables 4.9 and 4.10). All sites are well correlated except Air Lab 47-093-1013. This site does not correlate well with any site in the Knoxville Metropolitan Statistical Area.

	47-093-0028	47-093-1013	47-093-1017	47-093-1020	47-009-0004	47-105-0109
47-093-0028	1.0000					
47-093-1013	0.6047	1.0000				
47-093-1017	0.9636	0.6502	1.0000			
47-093-1020	0.9802	0.6396	0.9642	1.0000		
47-009-0004	0.9746	0.6077	0.9864	0.9616	1.0000	
47-105-0109	0.9798	0.6016	0.9858	0.9952	0.9898	1.0000
47-009-0011	0.9449	0.7978	0.9717	0.9444	0.9598	0.9614

Table 4.9 24-hr Design Value Pearson Correlation Matrix

	47-093-0028	47-093-1013	47-093-1017	47-093-1020	47-009-0004	47-105-0109
47-093-0028	1.0000					
47-093-1013	0.9373	1.0000				
47-093-1017	0.9872	0.9191	1.0000			
47-093-1020	0.9889	0.9168	0.9809	1.0000		
47-009-0004	0.9975	0.9233	0.9842	0.9914	1.0000	
47-105-0109	0.9912	0.9230	0.9900	0.9922	0.9929	1.0000
47-009-0011	0.9958	0.9376	0.9827	0.9879	0.9963	0.9935

Table 4.10 Annual Design Value Pearson Correlation Matrix

The removal bias produced by the USEPA Net Assessment tool is summarized in table 4.11 below. The absolute value of the mean relative bias <10% indicates that the data would not be significantly biased. Bearden (47-093-0028) and Rule (47-093-1017) meet this criterion. Air Lab (47-093-1013) and Springhill (47-093-1020) both have higher bias values indicating the removal of the site would bias the data.

Site	47-093-0028	47-093-1013	47-093-1017	47-093-1020
Neighbors Included	5	3	5	6
Daily OBS county	466	560	535	552
Mean Bias	0.26 µg/m ³	-1.36 µg/m ³	-0.32 µg/m ³	0.96 µg/m ³
Bias Std Deviation	1.61 µg/m ³	1.7 µg/m ³	1.41 µg/m ³	1.43 µg/m ³
Minimum Bias	-19.7 µg/m ³	-8.1 µg/m ³	-7.6 µg/m ³	-8.1 µg/m ³
Maximum Bias	15.4 µg/m ³	6.6 µg/m ³	5.4 µg/m ³	10.1 µg/m ³
Mean Relative Bias	5.6%	-14%	-2.9%	14.8%

Table 4.11 PM_{2.5} Removal Bias

4.3 Assessment Results

A site-by-site analysis was performed in each pollutant network to quantify the success of each site using the following metrics: Parameters Monitored, Collocated requirements, Trends Impact, Maximum Concentration, Deviation from NAAQS, Area Served, Correlations, and Removal Bias. Points were awarded and tallied. The data used for evaluation of each of the parameters is part of the Net

Assessment 2020 tool provided by USEPA and includes data through 2018, The results were sorted by pollutant and evaluated.

Parameters Monitored: Each site was given a point for each parameter monitored.

Collocated Requirements: Sites that meet CFR collocation requirements were given 1 point, those that are not collocated received 0.

Trends Impact: Sites with historical data greater than 15 years were given 3 points, 10-15 assigned 2 points, and 5-10 assigned 1 point.

Maximum concentration: Sites were given 2 points for recording the maximum concentration of a pollutant in the past 3 years.

Deviation from NAAQS: Sites were given 3 points if currently outside NAAQS, 2 points if exceedance within last 5 years and 1 point if within 85% of NAAQS, zero points if less than 85%.

Area Served¹: Using the population and the area served calculations from the Ambient air Monitoring Network Assessment tool, sites were given 2 point if the area served was greater than 150 square miles or population served was greater than 150,000, and 1 point if the area served was >75 sq miles and population served was greater than 75,000. Anything less was given zero points. Not applicable for Lead Monitoring.

Sensitive Populations: 1 point given if located in zip code of highest 2 categories of incidence of heart disease or asthma.

Correlation¹: Sites were given 1 point when correlation is <.8 for any other sites in CBSA. 2 points are given when <0.8 for 2 or more sites within CBSA. Correlation was only factored on Ozone and PM_{2.5}

Lead sites were given 2 points for being the source-oriented monitor.

Removal bias¹: Sites were given 1 point for Mean Bias ≥ 10%. Bias was only factored on Ozone and PM_{2.5}

1. Ambient Air Monitoring Network Assessment Tool

Site	Parameters	Collocated	Trends Impact	Max Concentration	NAAQS Deviation	Area Served	Sensitive Populations	Correlation	Removal Bias	Totals
East Knox	1	0	3	2	1	2	1	0	0	10
Spring Hill	3	0	3	0	1	2	1	0	0	10

The Ozone network requires 2 monitors (See Section 2.1). There are no extra monitors in the Ozone network. Both sites are within 85% of the NAAQS and are in zip codes which surround sensitive populations. Neither site is appropriate for removal or relocation at this evaluation.

Site	Parameters	Collocated	Trends Impact	Max Concentration	NAAQS Deviation	Area Served	Sensitive Populations	Correlation	Removal Bias	Totals
Ameristeel	1	0	1	2	0	n/a	1	2	n/a	7
Burnside	1	1	2	0	0	n/a	1	0	n/a	5

The lead network requires 1 source-oriented monitor, and 1 QA collocated monitor. Based upon this assessment the Burnside site is not necessary to meet the monitoring objectives outlined in Section 4.0 above. Therefore, considering operating costs, the value of trends data, and the representativeness of the data, Air Quality believes the Burnside site should be removed. Section 5.1.1 provides additional

data and the formal removal request in addition to the request to move the collocated monitor to the Ameristeel site.

Site	Parameters	Collocated	Trends Impact	Max Concentration	NAAQS Deviation	Area Served	Sensitive Populations	Correlation	Removal Bias	Totals
Air Lab	2	1	3	2	1	0	1	2	1	13
Bearden	1	1	3	0	0	2	0	1	0	8
Rule	1	0	3	2	0	1	1	1	0	9
Springhill	2	0	3	0	0	2	1	1	1	10

The PM_{2.5} network requires 2 sites and 1 collocated monitor (See Section 2.7). Based upon this assessment the Bearden site is not necessary to meet monitoring objectives outlined in section 4.0 above. Considering operating costs, the value of trends data, sensitive populations, and max concentrations Air Quality proposes that the Bearden site be removed. Additional data and formal removal request are presented in Section 5.1.2.

5.0 Proposed Changes

The EPA Region 4 governing authority approves Knox County’s distribution of monitors and the location of the collocated sites for compliance with Federal regulations. Any changes will be undertaken in partnership and direct advisement with the EPA (and TDEC, when applicable). Before decommissioning any SLAMS monitor, Air Quality will follow the procedure listed in 40 CFR Part 58.14, “System Modifications”. Any proposed changes to the air monitoring network will be documented in the Annual Network Plan.

Changes to the monitoring network may occur outside the Annual Monitoring Plan (AMP) and planning process due to unforeseen circumstances resulting from eviction or other situations that occur after the AMP has been posted for public inspection and approved by the EPA Regional Administrators. Any changes to the network due to circumstances beyond Air Quality’s control will be communicated in writing to the EPA Regional Authority, (and TDEC authorities, when applicable), and identified in the subsequent Annual Monitoring Plan.

5.1 Decommission and Relocations

According to 40 CFR 58.14 (c) (1) a monitor can be removed (after Regional Administrator approval) if it is currently in attainment with the applicable NAAQS standard and if the following four tests can be met:

1. The PM_{2.5}, ozone, carbon monoxide (CO), PM10, sulfate dioxide (SO₂), lead, or nitrogen dioxide (NO₂) monitor showed attainment during the previous five years.
2. The probability is less than 10% that the monitor will exceed 80% of the applicable NAAQS during the next three years based on the concentrations, trends, and variability observed in the past.
3. The monitor is not specifically required by an attainment plan or maintenance plan.
4. The monitor is not the last monitor in a nonattainment area or maintenance area that contains a contingency measure triggered by an air quality concentration in the latest attainment or maintenance plan adopted by the state and approved by EPA.

To conservatively demonstrate test 2, Air Quality shall use the equation $X + \frac{t*s}{\sqrt{n}} < 0.8 * NAAQS$
Where X is the average design value for the last 5 years (or more), t is the t value for n-1 degrees of

freedom at the 90% confidence level, s is the standard deviation of the design values, n is the number of design values, and NAAQS is the standard of interest.

5.1.1 Burnside Decommission Request

Air Quality is requesting the permanent decommissioning of the primary sampler at the Burnside site (47-093-0027) and relocating the collocated sampler to the Ameristeel site (47-093-0023). The site measured levels of lead are less than 50% of the NAAQS. Trends data in Figures 4.6, 4.7 and the exceedance probability Table 5.1 illustrates attainment of standard for the past 5 years. Table 5.1 below demonstrates a less than 10% probability that the site will come within 80% of the NAAQS. Furthermore, according to 40 CFR Part 58, Appendix D “Network Design Criteria for Ambient Air Quality Monitoring” Section 4.5, Air Quality is only required to operate one source specific Lead Monitor. Of the two current lead sites in the network, this requirement is best met by the Ameristeel site which meets any lead monitoring requirements of the Knox County portion of the state implementation plan.

Monitor	2015	2016	2017	2018	2019	Avg	Std Dev	n	t	NAAQS	80% of NAAQS	90% upper CI	Test Pass
Burnside	0.03	0.02	0.02	0.02	0.02	0.022	0.00447	5	2.13	0.15	0.12	0.02626	YES

Table 5.1 Burnside Probability of Exceedance

5.1.2 Bearden Decommission Request

Air Quality is requesting the permanent decommissioning of the primary sampler at the Bearden site (47-093-0028) and relocating the collocated sampler to the Rule site (47-093-1017). As both Bearden and Rule sites scored on the lower end of the network assessment, both were evaluated for removal in Table 5.2 below. Bearden passes the test for both standards. Trends data in Figure 4.8 and the yearly data in the Exceedance probability Table 5.2 illustrates attainment of standard for the past 5 years.

Monitor	2015	2016	2017	2018	2019	Avg	Std Dev	n	t	NAAQS	80% of NAAQS	90% upper CI	Test Pass
Bearden	9.2	9.3	8.9	8.3	7.7	8.68	0.67231	5	2.13	12	9.6	9.32042	YES
Bearden	19	20	19	18	16	18.4	1.51658	5	2.13	35	28	19.8446	YES
Rule	9.9	9.9	9.6	9.2	8.5	9.42	0.58907	5	2.13	12	9.6	9.98112	No
Rule	20	21	22	22	19	20.8	1.30384	5	2.13	35	28	22.042	YES

Table 5.2 PM_{2.5} Probability of Exceedance

There will be 3 remaining primary monitors in Air Quality’s network. Specific monitors are not required in the maintenance plan. In Section 4.3 of the State Implementation Plan “*The primary trigger of the contingency plan will be a quality assured/quality controlled violating design value (DV) of the annual PM_{2.5} NAAQS at any monitor.*” Removal of this monitor and site will not affect the contingency measure and evaluation of attainment in the Knoxville Metropolitan Statistical Area.

5.2 Replacements and Reassignments

Air Quality continues to purchase, as funds allow, APTI T640 continuous monitors to replace the Thermo 2025 intermittent filter-based samplers. Currently 2 instruments are in the testing phase prior to

deployment in the field and an additional monitor has been ordered. This transition was approved in the 2019 Network Plan. In 2020 Air Quality plans to place a T640 at the Rule site (47-093-1017), the FRM Thermo 2025 will remain sampling 1:3 during the initial set up and trial period. Upon 2 months of verified data and statistical review of the collocation precision, Air Quality requests changing the collocated sampling frequency to 1:6. This will meet the collocation requirement for this FEM. APTI T640 continuous monitors will next be placed at Springhill site (47-093-1020), replacing the FRM Thermo 2025. If decommission request in 5.1.2 above is approved the Bearden FRM Thermo 2025 and the Bearden collocated FRM Thermo 2025 will be discontinued on December 31,2020.

5.3 Commission of New Site

In the 2018 Annual Network Plan, Air Quality proposed the installation of a lead monitoring site on the southeast side of the Commercial Metals Company (CMC) based on recent modelling. In the 2019 Annual Network Plan, Air Quality was in the process of contacting property owner's for permission to site a monitor on their property. All contacted property owners denied Air Quality permission. Air Quality is still working with Region 4 US EPA to find a suitable and attainable location for this monitor. Air Quality has contacted 6 new property owners to request permission to cite the monitor on their property. In addition, CMC conducted a stack test in April 2020. Air Quality will update the modeling once the results are available and continue to work with Region 4 US EPA.

6.0 Appendix A -Equipment List

Equipment	Description	Serial Number	Condition	Put in service	Comments:
Air Lab Site: 47-093-1013					
PM 2.5 Sequential	Thermo Partisol Plus 2025	SN B225760909	Fair	2010	
Data Logger	ESC 8832	SN A3760K	Fair	2010	
PM10/ PM2.5 continuous	Teledyne T640X	SN192	Good	2018	2020 official method
T640X Pump	86R145-101-N270X	217909449	Good	2019	
Rule Site: 47-093-1017					
PM 2.5 Sequential	Thermo Partisol Plus 2026	SN B26451005	Good	2012	
Burnside Site: 47-093-0027					
TSP Hi-Vol	General Metal Works	SN P2875	Good	Unknown	
TSP Hi-Vol	Anderson/GMW	SN P04302	Good	Unknown	
Ameristeel Site: 47-093-0023					
TSP Hi-Vol	General Metal Works	SN P04304	Good	Unknown	
Bearden Site: 47-093-0028					
PM 2.5 Sequential	Thermo Partisol Plus 2025	SN B218930606	Fair	2007	Collocated Monitor
PM 2.5 Sequential	Thermo Partisol Plus 2025	SN B218940606	Fair	2007	
Spring Hill Site: 47-093-1020					
PM 2.5 Sequential	Thermo Partisol Plus 2025	SNB218920606	Fair	2007	

Equipment	Description	Serial Number	Condition	Put in service	Comments:
Carbon Sampler	URG 3000N	SN 3N-B0285	Poor	2007	
PM 2.5 Speciation	Met One Super SASS	SN G9188	Fair	2008	
Ozone Analyzer	Teledyne / API 400E	4005	Good	2018	
Ozone Calibrator	Teledyne / API 703E	190	Fair	2009	
Data Logger	ESC 8832	A 3758 K	Fair	2010	
East Knox Site: 47-093-0021					
Ozone Analyzer	Teledyne / API 400E	4006	Good	2018	
Ozone Calibrator	Teledyne / API 703E	189	Fair	2009	
Data Logger	ESC 8832	A 3757 K	Good	2010	
Back-up equipment located at the Air Lab					
Ozone Analyzer	Teledyne / API 400E	2014	Poor	2009	
Ozone Analyzer	Teledyne / API 400E	2013	Fair	2009	Back up analyzer
Ozone Analyzer	Teledyne / API 400E	2697	Poor	2011	used for parts
Ozone Calibrator	Teledyne / API 703E	188	Fair	2009	back up calibrator
Ozone Calibrator	Teledyne / API 703E	187	Good	2009	bench standard
ozone calibrator	Teledyne/ API 703U	179	Good	2017	audit standard
Data Logger	ESC 8832	A 3759 K	Good	2010	
Gast Pump	DOA-P704-AA	0611013627	Good	2011	Bench use
Gast Pump	DOA-P704-AA	611014883	Good	2011	For XZAS at sites
Gast Pump	DOA-P704-AA	611014884	Good	2011	Audit use
Gast Pump	75R647-V45-H306X	813944551	Fair	2015	back up
T640X Pump	86R145-101-N270X	718906665	Poor	2018	needs rebuild
TEOM Pump	87R647-V46-N470X	1115910619	Good	2018	
TEOM Pump	87R647-V46-N470X	1215908192	Fair	2016	
PM 10 Continuous	Thermo BAM 5014i	CM14521015	Poor	2015	not working
PM 2.5 Sequential	Thermo Partisol Plus 2025i	SN 20251W209521601	Good	2018	back up, some electrical issues
PM 2.5 Sequential	Thermo Partisol Plus 2025	SN B218950606	Fair	2007	Remote Connection issues
Hi-Vol Orifice	Anderson/GMW	P3619	Good	Unknown	
Hi-Vol Orifice	Anderson/GMW	P2861	Good	Unknown	
Hi-Vol Orifice	Anderson/GMW	P4306	Good	Unknown	

Equipment	Description	Serial Number	Condition	Put in service	Comments:
PM 2.5 Continuous	TEOM 1405	SN 1405A209531006	Good	2011	back up for AQI
Hi Vol Orifice	Andersen/GMW	SN P3084	Good	Unknown	
Hi Vol Orifice	Andersen/GMW	SN P999	Good	Unknown	
Hi Vol Orifice	General Metal Works	SN P1938	Good	Unknown	
PM 2.5 Continuous	T640	SN675	New	2020	purchased 2019
PM 2.5 Continuous	T640	SN910	New	2020	purchased 2020
PM 2.5 Continuous	T640	pending	New	2020	purchased 2020

Unknown status acquired from TDEC					
Carbon Sampler	URG module	3N-B0359	unknown	unknown	
Carbon Sampler	URG module	3N-B0767	unknown	Unknown	
Carbon Sampler	URG Controller	3N-B0700	unknown	Unknown	
Carbon Sampler	URG Controller	3N-B0704	unknown	Unknown	
Carbon Sampler	URG controller	3N-B0773	unknown	Unknown	
PM 2.5 Continuous	BAM 1020	K1258	unknown	Unknown	
PM 2.5 Continuous	BAM 1020	K1744	unknown	Unknown	
PM 2.5 Continuous	BAM 1020	K1808	unknown	Unknown	
PM 2.5 Continuous	BAM 1020	K1284	unknown	Unknown	
PM 2.5 Continuous	BAM 1020	K1254	unknown	Unknown	
PM 2.5 Sequential	Thermo Partisol 2025	2025B225160903	unknown	Unknown	
PM 2.5 Sequential	Thermo Partisol 2025	2025A207869809	unknown	Unknown	
PM 2.5 Sequential	Thermo Partisol 2025	2025B221650904	unknown	Unknown	
PM 2.5 Sequential	Thermo Partisol 2025	2025B225230903	unknown	Unknown	
BAM Pump	VP0935A-V0128-D2-0511	I1201501	unknown	Unknown	
BAM Pump	VP0935A-V0128-D2-0511	L1201714	unknown	Unknown	
BAM Pump	VP0935A-V0128-D2-0511	I0700583	unknown	Unknown	
BAM Pump	VP0935A-V0128-D2-0511	K0800879	unknown	Unknown	
BAM Pump	VP0935A-V0128-D2-0511	I0800732	unknown	Unknown	

2020 Ambient Air Monitoring Plan

Shelby County Health Department

Air Pollution Control Program

Including the Metropolitan Statistical Area

(Memphis, TN-MS-AR)



Public Health
Prevent. Promote. Protect.

Prepared by:

Judy Low

Supervisor A

May 15, 2020

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I. Introduction to the 2020 Ambient Air Monitoring Plan

Shelby County Health Department

Pollution Control Section

Air Monitoring Branch

The Shelby County Health Department (SCHD) Air Monitoring Branch (AMB) is required to evaluate the ambient air monitoring network each year in accordance with the requirements specified in 40 CFR Part 58, Subpart B § 58.10. An overview of the geography, general climate, wind direction and population trends are included to provide background information that will assist in understanding the current air monitoring network and reasons for placement of the existing monitoring sites.

The principal areas in Shelby County with air monitoring sites are depicted showing the location for each of the monitoring sites. The sites are identified by a site number, site name, site address, an air quality site identification number and the types of pollutants monitored at each location. Tables containing relevant information are also included. A Network Review that requests for changes or provides updates is included along with the Memorandum of Agreement between Crittenden County, AR and Desoto County, MS.

This Network Plan submitted by Shelby County will be incorporated with the other local programs from the State of Tennessee and included in the 2020 Annual Network Plan provided by the State of Tennessee Department of Environment and Conservation Division of Air Pollution Control and submitted to the Region 4 offices of the Environmental Protection Agency by July 1 of each calendar year.

II. Shelby County's Interpretation of Ambient Air Monitors Needed to Meet the 40CFR, Part 58 Requirements

Census Area Identification and Population Data			14129 Lead		42101 CO		42401 SO ₂		42602 NO ₂		44201 Ozone		81102 PM ₁₀ and 85101 PM ₁₀ Lo Vol		88101 PM _{2.5}			88502 PM _{2.5} Speciation		88502 PM _{2.5} Continuous			
CBSA Code	Census 2010 /Est. 2015	CBSA Title (MS Areas)	Operating	Required	Operating	Required	Operating	Required	Operating	Required	Operating	2017-2019 8 Hr. DV	Required	Operating	Required	Operating	2017 -2019 Annual DV µg/m ³	2017 -2019 24 Hr. DV µg/m ³	Required	Operating	Required	Operating	Required
32820	1324829 / 1344127	Memphis, TN-MS-AR	0	0	2 ^{2,3}	1	1 ²	1	1 ^{1,3,4}	2	3	0.069 Shelby Farms NCore	2	2 ⁵	2 - 4	3 ¹	8.6 Alabama Ave.	18 SWTCC Near Road	2	1	1	1	1 - 2

¹The Shelby County Health Department and the states of Arkansas and Mississippi have implemented a joint MOA that provides for meeting the MSA monitoring requirements for the combined MSA area. See page 48 in the Appendix.

²Includes trace level analyzer at Shelby Farms NCore Air Monitoring Station

³Includes trace level analyzer at Southwest Tennessee Community College Near Road Air Monitoring Station

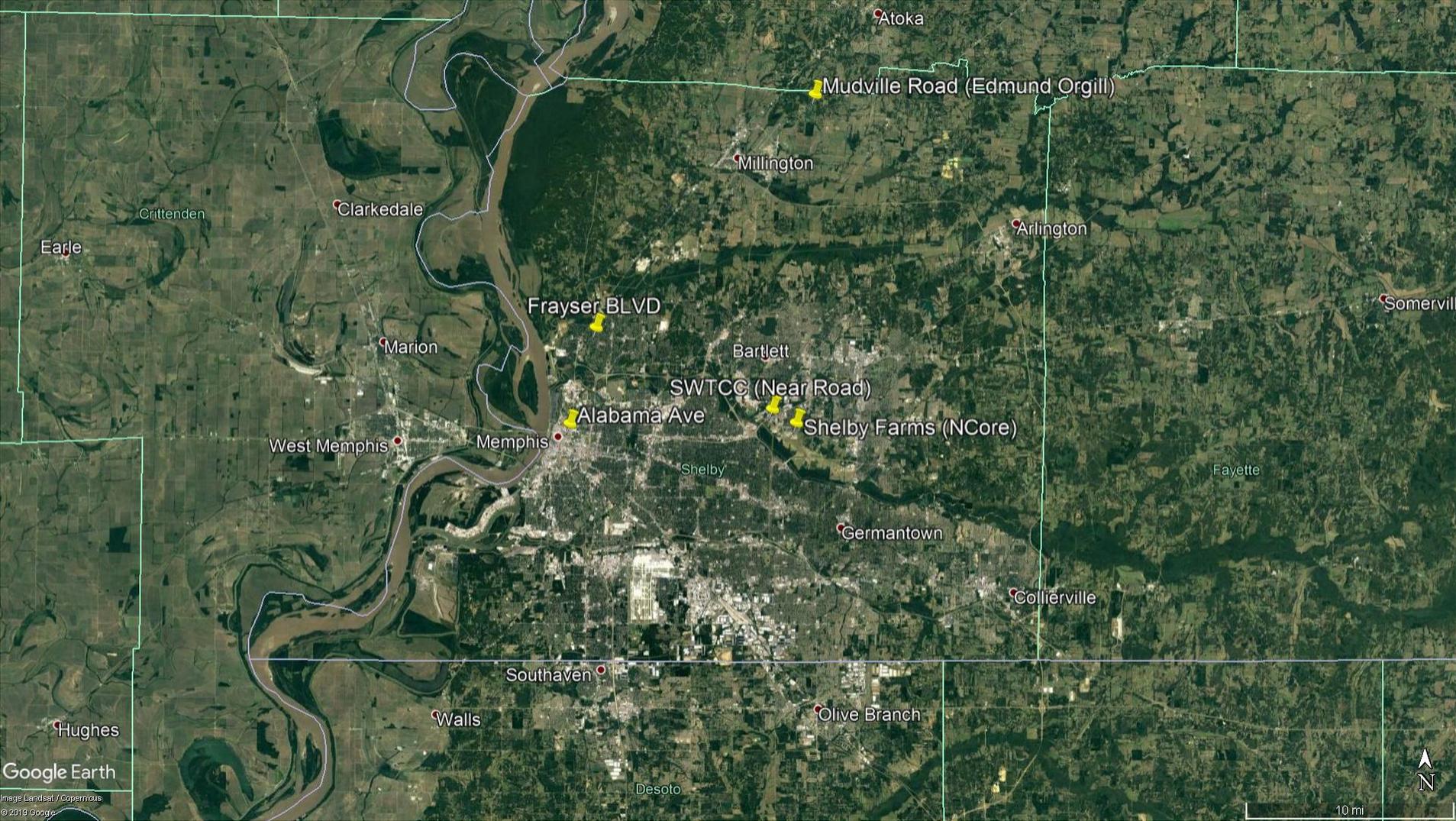
⁴Monitor located in Marion, Arkansas just to the northwest of downtown Memphis.

⁵Includes the low volume PM sampler at Shelby Farms NCore

Discussions of any proposals to re-locate monitors in the next 18 months and suitability of PM_{2.5} sites for use in comparisons to the annual PM_{2.5} standard:

- The TEOM POC 3 PM_{2.5} particulate monitor and the speciation POC 6 STN monitor are generally not suited to be used for comparisons to the annual PM_{2.5} standards.
- The TEOM POC 3 PM_{2.5} particulate monitor is used for AQI forecasting purposes.

III. Map of Shelby County Site Locations



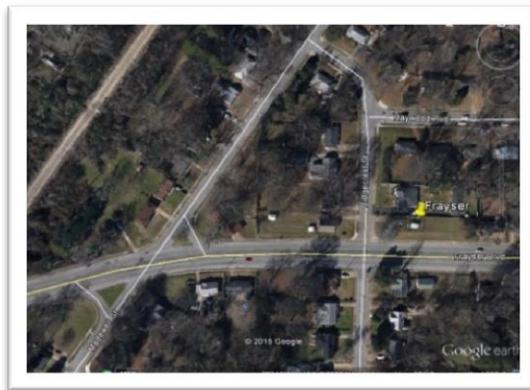
IV. Shelby County Air Monitoring Sites

(Background, Discussion, Site Evaluation Form and Site Pictures)

- A. Frayser
- B. Alabama
- C. Shelby Farms NCore
- D. Southwest Tennessee Community College Near Road
- E. Edmund Orgill Park

All SCHD AMB sites meet the siting criteria as found in 40 CFR Part 58, Appendix E for probe and monitoring path for particulate matter (PM_{10} and $PM_{2.5}$), ozone (O_3), carbon monoxide (CO), nitrogen oxides ($NO/NO_2/NO_y$), and sulfur dioxide (SO_2). These sites will be reevaluated annually for compliance with this criterion. These sites are part of the SCHD ambient air monitoring network and operated to ensure continued compliance to 40 CFR Part 58, Appendix D network design requirements. These sites are summarized in Section II. Current site evaluations with site pictures and distance measurements are provided in Section IV.

A. Frayser, Shelby County, TN



Reporting Org. Name	Memphis/Shelby County Health Dept.
PQAO	673
Address	1330 Frayser Blvd.
AQS ID	47-157-0021
County Name	Shelby
CBSA	32820
Latitude	35.217501
Longitude	-90.019707
Parameter Code	44201
Parameter Name	Ozone
Monitor Type	SLAMS
POC	1
Interval	1
Year	2020
Collection Frequency	Hourly
Method	087
FRM/FEM Monitoring Instrument	Teledyne Advanced Pollution Instrumentation, Inc. Model 400/400A/400E/T400
Analysis	Ultraviolet Absorption
Ref. Method ID	EQOA-0992-087
Monitor Objective Type	Population Exposure
Dominant Source	Area
Measurement Scale	Neighborhood
Land Use Type	Residential
Location Setting	Suburban
Date Site Established	19720901

Site Background and Discussion

This site is located on Frayser Blvd. in Shelby County, Tennessee and currently supports monitoring for ozone. This site was originally established in 1972 and is expected to operate during CY's 2020 and 2021.

This site is located downwind of the Metro-Memphis area in a heavily populated area. There are railroad tracks and an overpass that are approximately 250 meters west of the site.

Site Evaluation Field Form

SITE NAME: FRAYSER

AQS Site ID: 47-157-0021 Location: 1330 Frayser Blvd. Date: 04/17/20 Evaluator: JL

Site Coordinates: LATITUDE 35.217501 LONGITUDE -90.019707

Monitoring Scale: Neighborhood

Pollutant	Sampler/Probe Inlet Height (IH in m)	Inlet Location	Horizontal Distance (m)	Vertical Distance (m)	Pass/Fail
O ₃	4.46 m	Side of building	31 m	23.49 m	Pass

Obstruction	Obstruction Height (OH)	Obstruction Distance (OD)	Dripline	Pass/Fail
Tree east of site	23.49 m	$2 (23.49 - 4.46) = 38.06$ m	29 m	Pass

Dripline should be >20 m from the dripline of tree(s) and must be 10 m from the dripline when the tree(s) act as an obstruction.
 For Horizontal and Vertical Distances: Separation Distance = (1 meter for O₃, CO, SO₂, NO₂) and (2 meters for PM, Pb)
 When probe is located on a rooftop, this separation distance is in reference to walls, parapets, or penthouses located on roof.

Are all probes at least 1 meter apart? Yes

Are all collocated low volume samplers between 1 to 4 meters apart? N/A

Are all collocated high volume samplers between 2 to 4 meters apart? N/A

Are all probes located in an area that is paved or has vegetative ground cover? Yes

Are all rooftop samplers located at least 2 meters away from any structure? Yes

Is there unrestricted air flow 270 degrees around the probe or sampler? Yes

Site Pictures for Frayser

Frayser (North)



Frayser (Northeast)



Frayser (East)



Frayser (Southeast)



Site Pictures for Frayser

Frayser (South)



Frayser (Southwest)



Frayser (West)



Frayser (Northwest)



B. Alabama Ave., Shelby County, TN



Reporting Org. Name	Memphis/Shelby County Health Dept.	
PQAO	673	
Address	416 Alabama Ave.	
AQS ID	47-157-0024	
County Name	Shelby	
CBSA	32820	
Latitude	35.151194	
Longitude	-90.041559	
Parameter Code	88101	88502
Parameter Name	PM 2.5	PM 10
Monitor Type	SLAMS	SLAMS
POC	1	1
Interval	7	1
Year	2020	2020
Collection Frequency	1 in 3	Hourly
Method	118	079
FRM/FEM Monitoring Instrument	Thermo 2025I PM 2.5 Sequential Sampler	Thermo Scientific TEOM 1405 Ambient Particulate Monitor
Analysis	Gravimetric	Gravimetric
Ref. Method ID	RFPS-0498-118	EQPM-1090-079
Monitor Objective Type	Population Exposure	Population Exposure
Dominant Source	Area	Area
Measurement Scale	Neighborhood	Neighborhood
Land Use Type	Residential	Residential
Location Setting	Suburban	Suburban
Date Site Established	20170101	20160403

Site Background and Discussion

The Alabama Ave. site is located in Shelby County, Tennessee and currently supports monitoring for PM_{2.5}, PM₁₀ (TEOM) and the Radnet program. This site is approximately 25 meters south of Interstate 40 and 50 meters north of apartment complexes.

This site was originally established in 1973 and is expected to operate during CY's 2020 and 2021.

Site Evaluation Field Form

SITE NAME: ALABAMA

AQS Site ID: 47-157-0024 Location: 416 Alabama Ave. Date: 04/17/20 Evaluator: JL

Site Coordinates: LATITUDE 35.151194 LONGITUDE: -90.041559

Monitoring Scale: Neighborhood

Pollutant	Sampler/Probe Inlet Height (IH in m)	Inlet Location	Horizontal Distance (m)	Vertical Distance (m)	Pass/Fail
PM _{2.5} (low)	2.03 m	Ground	21.05 m	22 m	Pass
PM 10 (TEOM) (continuous)	4.318 m	Roof	14.97 m	24.79 m	Pass

Obstruction	Obstruction Height (OH)	Obstruction Distance (OD)	Dripline	Pass/Fail
Large tree NE of PM ₁₀	15.44 m	$2 (15.44 - 4.318) = 22.24$ m	23 m	Pass
Large tree NE of PM _{2.5}	15.44 m	$2 (15.44 - 2.03) = 26.82$ m	25 m	Pass

Dripline should be >20 m from the dripline of tree(s) and must be 10 m from the dripline when the tree(s) act as an obstruction.

For Horizontal and Vertical Distances: Separation Distance = (1 meter for O₃, CO, SO₂, NO₂) and (2 meters for PM, Pb)

When probe is located on a rooftop, this separation distance is in reference to walls, parapets, or penthouses located on roof.

Are all probes at least 1 meter apart? Yes

Are all collocated low volume samplers between 1 to 4 meters apart? N/A

Are all collocated high volume samplers between 2 to 4 meters apart? N/A

Are all probes located in an area that is paved or has vegetative ground cover? Yes

Are all rooftop samplers located at least 2 meters away from any structure? Yes

Is there unrestricted air flow 270 degrees around the probe or sampler? Yes

Site Pictures for Alabama

Alabama (North)



Alabama (Northeast)



Alabama (East)



Alabama (Southeast)



Site Pictures for Alabama

Alabama (South)



Alabama (Southwest)



Alabama (West)



Alabama (Northwest)



**C. Shelby Farms NCore,
Shelby County, TN**



Reporting Org. Name		Memphis/Shelby County Health Dept.	
PQAO		673	
Address		6388 Haley Rd.	
AQS ID		47-157-0075	
County Name		Shelby	
CBSA		32820	
Latitude		35.151699	
Longitude		-89.850249	
Parameter Code	42101	42401	42600
Parameter Name	CO (trace)	SO ₂ (trace)	NOy
Monitor Type	NCore (SLAMS)	NCore (SLAMS)	NCore (SLAMS)
POC	1	1	1
Interval	1	1	1
Year	2020	2020	2020
Collection Frequency	Hourly	Hourly	Hourly
Method	093	100	699
FRM/FEM Monitoring Instrument	Teledyne Advanced Pollution Instrumentation, Inc. Models 300/300E/300EU/T300/T300U	Teledyne Advanced Pollution Instrumentation, Inc. Models 100A/100E/100EU/T100/T100U	Teledyne Advanced Pollution Instrumentation, Inc. Models 200A/200AU/200E/200EU/T200/T200U
Analysis	Gas Filter Correlation	Ultraviolet Fluorescence	Chemiluminescence
Ref. Method ID	RFCA-1093-593	EQSA-0495-100	RFNA-1194-699
Monitor Objective Type	Population Exposure	Population Exposure	Population Exposure
Dominant Source	Area	Area	Area
Measurement Scale	Neighborhood and Urban Scale	Neighborhood and Urban Scale	Neighborhood and Urban Scale
Land Use Type	Industrial	Industrial	Industrial
Location Setting	Urban	Urban	Urban
Date Site Established	20110401	20110621	20110617

**C. Shelby Farms NCore,
Shelby County, TN**



Reporting Org. Name		Memphis/Shelby County Health Dept.	
PQAO		673	
Address		6388 Haley Rd.	
AQS ID		47-157-0075	
County Name		Shelby	
CBSA		32820	
Latitude		35.151699	
Longitude		-89.850249	
Parameter Code	44201	61103	61104
Parameter Name	O ₃	Wind Speed-Resultant	Wind Direction - Resultant
Monitor Type	NCore (SLAMS)	NCore (SLAMS)	NCore (SLAMS)
POC	1	1	1
Interval	1	1	1
Year	2020	2020	2020
Collection Frequency	Hourly	Hourly	Hourly
Method	087	065	065
FRM/FEM Monitoring Instrument	Teledyne Advanced Pollution Instrumentation, Inc. Models 400E/T400/400/400A	RM Young Model 05305	RM Young Model 05305
Analysis	Ultraviolet Absorption	miles per hour	Degrees compass
Ref. Method ID	EQOA-0992-087	N/A	N/A
Monitor Objective Type	Population Exposure	Population Exposure	Population Exposure
Dominant Source	Area	Area	Area
Measurement Scale	Neighborhood and Urban Scale	Neighborhood and Urban Scale	Neighborhood and Urban Scale
Land Use Type	Industrial	Industrial	Industrial
Location Setting	Urban	Urban	Urban
Date Site Established	20110311	20120701	20120701

**C. Shelby Farms NCore,
Shelby County, TN**



Reporting Org. Name		Memphis/Shelby County Health Dept.	
PQAO		673	
Address		6388 Haley Rd.	
AQS ID		47-157-0075	
County Name		Shelby	
CBSA		32820	
Latitude		35.151699	
Longitude		-89.850249	
Parameter Code	62101	62201	64101
Parameter Name	Outdoor Temperature	Relative Humidity	Barometric Pressure
Monitor Type	NCore (SLAMS)	NCore (SLAMS)	NCore (SLAMS)
POC	1	1	1
Interval	1	1	1
Year	2020	2020	2020
Collection Frequency	Hourly	Hourly	Hourly
Method	060	060	014
FRM/FEM Monitoring Instrument	RM Young 41382VC	RM Young 41382VC	Barometric Sensor
Analysis	percent relative humidity	degrees Fahrenheit	Millibars
Ref. Method ID	N/A	N/A	N/A
Monitor Objective Type	Population Exposure	Population Exposure	Population Exposure
Dominant Source	Area	Area	Area
Measurement Scale	Neighborhood and Urban Scale	Neighborhood and Urban Scale	Neighborhood and Urban Scale
Land Use Type	Industrial	Industrial	Industrial
Location Setting	Urban	Urban	Urban
Date Site Established	20120701	20120701	20120701

**C. Shelby Farms NCore,
Shelby County, TN**



Reporting Org. Name		Memphis/Shelby County Health Dept.	
PQAO			673
Address			6388 Haley Rd.
AQS ID			47-157-0075
County Name			Shelby
CBSA			32820
Latitude			35.151699
Longitude			-89.850249
Parameter Code	85101 and 81102 (STP)	86101	88101
Parameter Name	PM ₁₀ (low volume)	PM _{10-2.5} (coarse)	PM _{2.5}
Monitor Type	NCore (SLAMS)	NCore (SLAMS)	NCore (SLAMS)
POC	1	1	1
Interval	7	7	7
Year	2020	2020	2020
Collection Frequency	1 in 3	1 in 3	1 in 3
Method	127	176	118
FRM/FEM Monitoring Instrument	R&P Partisol Plus 2025 Sequential Sampler	R&P Partisol Plus 2025 Sequential Sampler	R&P Partisol Plus 2025 Sequential Sampler
Analysis	Gravimetric	Gravimetric	Gravimetric
Ref. Method ID	RFPS-1298-127	RFPS-0509-176	RFPS-0498-118
Monitor Objective Type	Population Exposure	Population Exposure	Population Exposure
Dominant Source	Area	Area	Area
Measurement Scale	Neighborhood and Urban Scale	Neighborhood and Urban Scale	Neighborhood and Urban Scale
Land Use Type	Industrial	Industrial	Industrial
Location Setting	Urban	Urban	Urban
Date Site Established	20120116	20120116	20110223

**C. Shelby Farms NCore,
Shelby County, TN**



Reporting Org. Name		Memphis/Shelby County Health Dept.	
PQAO		673	
Address		6388 Haley Rd.	
AQS ID		47-157-0075	
County Name		Shelby	
CBSA		32820	
Latitude		35.151699	
Longitude		-89.850249	
Parameter Code	88101	88502	88502
Parameter Name	PM _{2.5}	PM _{2.5} continuous	PM _{2.5} Speciation
Monitor Type	NCore (SLAMS)	NCore (AQI forecasting)	NCore (SLAMS)
POC	2	3	6
Interval	7	1	7
Year	2020	2020	2020
Collection Frequency	1 in 6	Hourly	1 in 3
Method	118	711	N/A
FRM/FEM Monitoring Instrument	R&P Partisol Plus 2025 PM 2.5 Sequential Sampler	R&P TEOM Gravimetric 50 degrees Celsius PM 2.5 SSI w/no correction factor	Met One SASS 810/URG 3000N
Analysis	Gravimetric	TEOM Gravimetric 50 degrees Celsius	Speciation Analysis
Ref. Method ID	RFPS-0498-118	711	N/A
Monitor Objective Type	Population Exposure	Population Exposure	Population Exposure
Dominant Source	Area	Area	Area
Measurement Scale	Neighborhood and Urban Scale	Neighborhood and Urban Scale	Neighborhood and Urban Scale
Land Use Type	Industrial	Industrial	Industrial
Location Setting	Urban	Urban	Urban
Date Site Established	20160101	20110408	20110208

**C. Shelby Farms NCore,
Shelby County, TN**



Reporting Org. Name	Memphis/Shelby County Health Dept.
PQAO	673
Address	6388 Haley Rd.
AQS ID	47-157-0075
County Name	Shelby
CBSA	32820
Latitude	35.151699
Longitude	-89.850249
Parameter Code	81102
Parameter Name	PM ₁₀
Monitor Type	NCore (SLAMS)
POC	2
Interval	7
Year	2020
Collection Frequency	1 in 12
Method	127
FRM/FEM Monitoring Instrument	R & P Partisol Plus 2025 Sequential Sampler
Analysis	Gravimetric
Ref. Method ID	RFPS-1298-127
Monitor Objective Type	Population Exposure
Dominant Source	Area
Measurement Scale	Neighborhood and Urban Scale
Land Use Type	Industrial
Location Setting	Urban
Date Site Established	20180101

Site Background and Discussion for Shelby Farms NCore

The Shelby Farms NCore site is located in Shelby County Tennessee and currently supports monitoring for carbon monoxide (trace), ozone, total reactive nitrogen (trace), particulate matter (PM_{2.5}; PM_{10-2.5} and PM₁₀ low volume, sulfur dioxide (trace), and meteorological data (ambient temperature, barometric pressure, relative humidity, wind direction and wind speed).

This site was established in 2011 and is expected to operate in CY's 2020 and 2021.

The placement of the NCore site is east of the urban core and provides the best location for measuring transport and secondary pollutant formation from that area. The site is located downwind of the more industrialized areas.

Site Evaluation Field Form

SITE NAME: SHELBY FARMS NCore

AQS Site ID: 47-157-0075 Location: 6388 Haley Rd. Date: 05/04/20 Evaluator: JL

Site Coordinates: LATITUDE 35.151699 LONGITUDE -89.850249

Monitoring Scale: Neighborhood and Urban Scale

Pollutant	Sampler/Probe Inlet Height (IH in m)	Inlet Location	Horizontal Distance (m)	Vertical Distance (m)	Pass/ Fail
PM _{2.5} (low volume)	2.03 m	Ground level support	89 m	22.1 m	Pass
PM _{2.5} (collocated) (low volume)	2.03 m	Ground level support	87 m	22.1 m	Pass
PM ₁₀ (low volume)	2.03 m	Ground level support	90 m	22.1 m	Pass
PM ₁₀ (collocated) (low volume)	2.03 m	Ground level support	92 m	22.1 m	Pass
PM _{2.5} (TEOM) (continuous)	4.6 m	Roof	85 m	22.1 m	Pass
CO	3.8 m	Side of shelter	86 m	22.1 m	Pass
NO _y , NO	10 m	Met tower	93 m	22.1 m	Pass
O ₃	3.7 m	Side of shelter	83 m	22.1 m	Pass

SO ₂	3.6 m	Side of shelter	85 m	22.1 m	Pass
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Obstruction	Obstruction Height (OH)	Obstruction Distance (OD)	Dripline	Pass/Fail
Tree east of site (PM _{2.5} , PM _{2.5} (collocated), PM ₁₀ , PM ₁₀ (collocated))	22.1 m	$2 (22.1 - 2.03) = 40.14 \text{ m}$	88 m	Pass
Tree east of site PM _{2.5} (TEOM)	22.1 m	$2 (22.1 - 4.6) = 35\text{m}$	88 m	Pass
Tree east of site (CO)	22.1 m	$2 (22.1 - 3.8) = 36.6\text{m}$	88 m	Pass
Tree east of site (NO, NO _y)	22.1 m	$2 (22.1 - 10) = 24.2\text{m}$	88 m	Pass
Tree east of site (SO ₂)	22.1 m	$2 (22.1 - 3.6) = 37\text{m}$	88 m	Pass

Dripline should be >20 m from the dripline of tree(s) and must be 10 m from the dripline when the tree(s) act as an obstruction.
For Horizontal and Vertical Distances: Separation Distance = (1 meter for O₃, CO, SO₂, NO₂) and (2 meters for PM, Pb)
When probe is located on a rooftop, this separation distance is in reference to walls, parapets, or penthouses located on roof.

Are all probes at least 1 meter apart? Yes

Are all collocated low volume samplers between 1 to 4 meters apart? Yes

Are all collocated high volume samplers between 2 to 4 meters apart? N/A

Are all probes located in an area that is paved or has vegetative ground cover? Yes

Are all rooftop samplers located at least 2 meters away from any structure? Yes

Is there unrestricted air flow 270 degrees around the probe or sampler? Yes

Site Pictures for Shelby Farms NCore

Shelby Farms NCore (North)



Shelby Farms NCore (Northeast)



Shelby Farms NCore (East)



Shelby Farms NCore (Southeast)



Site Pictures for Shelby Farms NCore

Shelby Farms NCore (South)



Shelby Farms NCore (Southwest)



Shelby Farms NCore (West)



Shelby Farms NCore (Northwest)



**D. Southwest Tennessee Community College,
Near Road Monitoring Station, Shelby County, TN**



Reporting Org. Name	Memphis/Shelby County Health Dept.	
PQAO	673	
Address	5767 Macon Cove	
AQS ID	47-157-0100	
County Name	Shelby	
CBSA	32820	
Latitude	35.161264	
Longitude	-89.870646	
Parameter Code	42101	42602
Parameter Name	CO (trace)	NO ₂ (trace)
Monitor Type	Near Road (SLAMS)	Near Road (SLAMS)
POC	1	1
Interval	1	1
Year	2020	2020
Collection Frequency	hourly	hourly
Method	593	599
FRM/FEM Monitoring Instrument	Teledyne Advanced Pollution Instrumentation, Inc. Models 300/300E/300EU/T300/T300U	Teledyne Advanced Pollution Instrumentation, Inc. Models 200A/200AU/200E/200EU/T200/T200U
Analysis	Gas Filter Correlation	Chemiluminescence
Ref. Method ID	RFCA-1093-593	RFNA-1194-599
Monitor Objective Type	Highest Concentration	Highest Concentration
Dominant Source	Mobile	Mobile
Measurement Scale	Neighborhood and Urban Scale	Neighborhood and Urban Scale
Land Use Type	Residential	Residential
Location Setting	Urban	Urban
Date Site Established	20140715	20140701

Site Background and Discussion

The Near Road Air Monitoring Station is located on the campus of Southwest Tennessee Community College in Shelby County, Tennessee and currently supports monitoring for carbon monoxide (trace), nitrogen dioxide (trace) and PM_{2.5}.

This site was established in 2014 as part of the second phase of the core based statistical area Near Road NO₂ monitoring. This site is expected to operate during CY's 2020 and 2021.

**D. Southwest Tennessee Community College,
Near Road Monitoring Station, Shelby County, TN**



Reporting Org. Name	Memphis/Shelby County Health Dept.
PQAO	673
Address	5767 Macon Cove
AQS ID	47-157-0100
County Name	Shelby
CBSA	32820
Latitude	35.161264
Longitude	-89.870646
Parameter Code	88101
Parameter Name	PM _{2.5}
Monitor Type	Near Road (SLAMS)
POC	1
Interval	7
Year	2020
Collection Frequency	1 in 3
Method	118
FRM/FEM Monitoring Instrument	Thermo 2025I PM 2.5 Sequential Sampler
Analysis	Gravimetric
Ref. Method ID	RFPS-0498-118
Monitor Objective Type	Highest Concentration
Dominant Source	Mobile
Measurement Scale	Neighborhood and Urban Scale
Land Use Type	Residential
Location Setting	Urban
Date Site Established	20170101

**D. Southwest Tennessee Community College,
Near Road Monitoring Station, Shelby County, TN**



Reporting Org. Name	Memphis/Shelby County Health Dept.
PQAO	673
Address	5767 Macon Cove
AQS ID	47-157-0100
County Name	Shelby
CBSA	32820
Latitude	35.161264
Longitude	-89.870646
Parameter Code	88101
Parameter Name	PM _{2.5} (T640)
Monitor Type	Near Road (SLAMS)
POC	2
Interval	1
Year	2020
Collection Frequency	Hourly
Method	236
FRM/FEM Monitoring Instrument	Teledyne Advanced Pollution Instrumentation Model T640 PM Mass Monitor
Analysis	Gravimetric
Reference Method ID	EQPM-0516-236
Monitor Objective Type	Highest Concentration
Dominant Source	Mobile
Measurement Scale	Neighborhood and Urban Scale
Land Use Type	Residential
Location Setting	Urban
Date Site Established	20190101

Site Evaluation Field Form

SITE NAME: SOUTHWEST TENNESSEE COMMUNITY COLLEGE (Near Road)

AQS Site ID: 47-157-0100 Location: 5787 Macon Cv. Date: 05/05/20 Evaluator: JL

Site Coordinates: LATITUDE 35.161264 LONGITUDE: -89.870646

Monitoring Scale: Neighborhood and Urban Scale

Pollutant	Sampler/Probe Inlet Height (IH in m)	Inlet Location	Horizontal Distance (m)	Vertical Distance (m)	Pass/ Fail
CO	4.2 m	roof	24 m	21.03 m	Pass
NO ₂	4.2 m	roof	24 m	21.03 m	Pass
PM _{2.5}	4.5 m	roof	24 m	21.03 m	Pass
PM _{2.5} (T640)	4.5 m	roof	24 m	21.03 m	Pass

Obstruction	Obstruction Height (OH)	Obstruction Distance (OD)	Dripline	Pass/Fail
Tree South Southwest of Station (CO, NO ₂)	21.03m	2 (21.03 - 4.2) = 33.66 m	19 m	Pass
Tree South Southwest of Station (CO, NO ₂)	21.03 m	2 (21.03 - 4.5) = 33.06 m	19 m	Pass

Dripline should be >20 m from the dripline of tree(s) and must be 10 m from the dripline when the tree(s) act as an obstruction.
 For Horizontal and Vertical Distances: Separation Distance = (1 meter for O₃, CO, SO₂, NO₂) and (2 meters for PM, Pb)
 When probe is located on a rooftop, this separation distance is in reference to walls, parapets, or penthouses located on roof.

Are all probes at least 1 meter apart? Yes

Are all collocated low volume samplers between 1 to 4 meters apart? Yes

Are all collocated high volume samplers between 2 to 4 meters apart? N/A

Are all probes located in an area that is paved or has vegetative ground cover? Yes

Are all rooftop samplers located at least 2 meters away from any structure? Yes

Is there unrestricted air flow 270 degrees around the probe or sampler? Yes

Site Pictures for Southwest Tennessee Community College (SWTCC) Near Road

SWTCC (North)



SWTCC (Northeast)



SWTCC (East)



SWTCC (Southeast)



Site Pictures for Southwest Tennessee Community College (SWTCC) Near Road

SWTCC (South)



SWTCC (Southwest)



SWTCC (West)



SWTCC (Northwest)



E. Edmund Orgill Park, Shelby County, TN



Reporting Org. Name	Memphis/Shelby County Health Dept.
PQAO	673
Address	6855 Mudville Rd.
AQS ID	47-157-1004
County Name	Shelby
CBSA	32820
Latitude	35.161264
Longitude	-89.870646
Parameter Code	44201
Parameter Name	Ozone
Monitor Type	SLAMS
POC	1
Interval	1
Year	2020
Collection Frequency	Hourly
Method	087
FRM/FEM Monitoring Instrument	Teledyne Advanced Pollution Instrumentation, Inc. Model 400/400A/400E/T400
Analysis	Ultraviolet Absorption
Ref. Method ID	EQOA-0992-087
Monitor Objective Type	Population Exposure
Dominant Source	Area
Measurement Scale	Urban
Land Use Type	Agricultural
Location Setting	Rural
Date Site Established	19800201

Site Background and Discussion

The Edmund Orgill Park site is located in the City of Millington in Shelby County, Tennessee and currently supports monitoring for ozone.

This site was established in 1980 and is expected to operate during CY's 2020 and 2021.

Site Evaluation Field Form

Site Name: Edmund Orgill Park

AQS Site ID: 47-157-1004 Location: 6855 Mudville Rd. Date: 04/16/20 Evaluator: YC

Site Coordinates: Latitude 35.161264 Longitude -89.870646

Monitoring Scale: Agricultural

Pollutant	Sampler/Probe Inlet Height (IH in m)	Inlet Location	Horizontal Distance (m)	Vertical Distance (m)	Pass/ Fail
O ₃	3.34 m	Side of building	21.21 m	10.94 m	Pass

Obstruction	Obstruction Height (OH)	Obstruction Distance (OD)	Dripline	Pass/Fail
Tree northwest of site	10.94 m	2 (10.94 – 3.34) = 15.2 m	22.2 m	Pass

Dripline should be >20 m from the dripline of tree(s) and must be 10 m from the dripline when the tree(s) act as an obstruction.
 For Horizontal and Vertical Distances: Separation Distance = (1 meter for O₃, CO, SO₂, NO₂) and (2 meters for PM, Pb)
 When probe is located on a rooftop, this separation distance is in reference to walls, parapets, or penthouses located on roof.

Are all probes at least 1 meter apart? Yes

Are all collocated low volume samplers between 1 to 4 meters apart? N/A

Are all collocated high volume samplers between 2 to 4 meters apart? N/A

Are all probes located in an area that is paved or has vegetative ground cover? Yes

Are all rooftop samplers located at least 2 meters away from any structure? Yes

Is there unrestricted air flow 270 degrees around the probe or sampler? Yes

Site Pictures for Edmund Orgill Park

Edmund Orgill (North)



Edmund Orgill (Northeast)



Edmund Orgill (East)



Edmund Orgill (Southeast)



Site Pictures for Edmund Orgill Park

Edmund Orgill (South)



Edmund Orgill (Southwest)



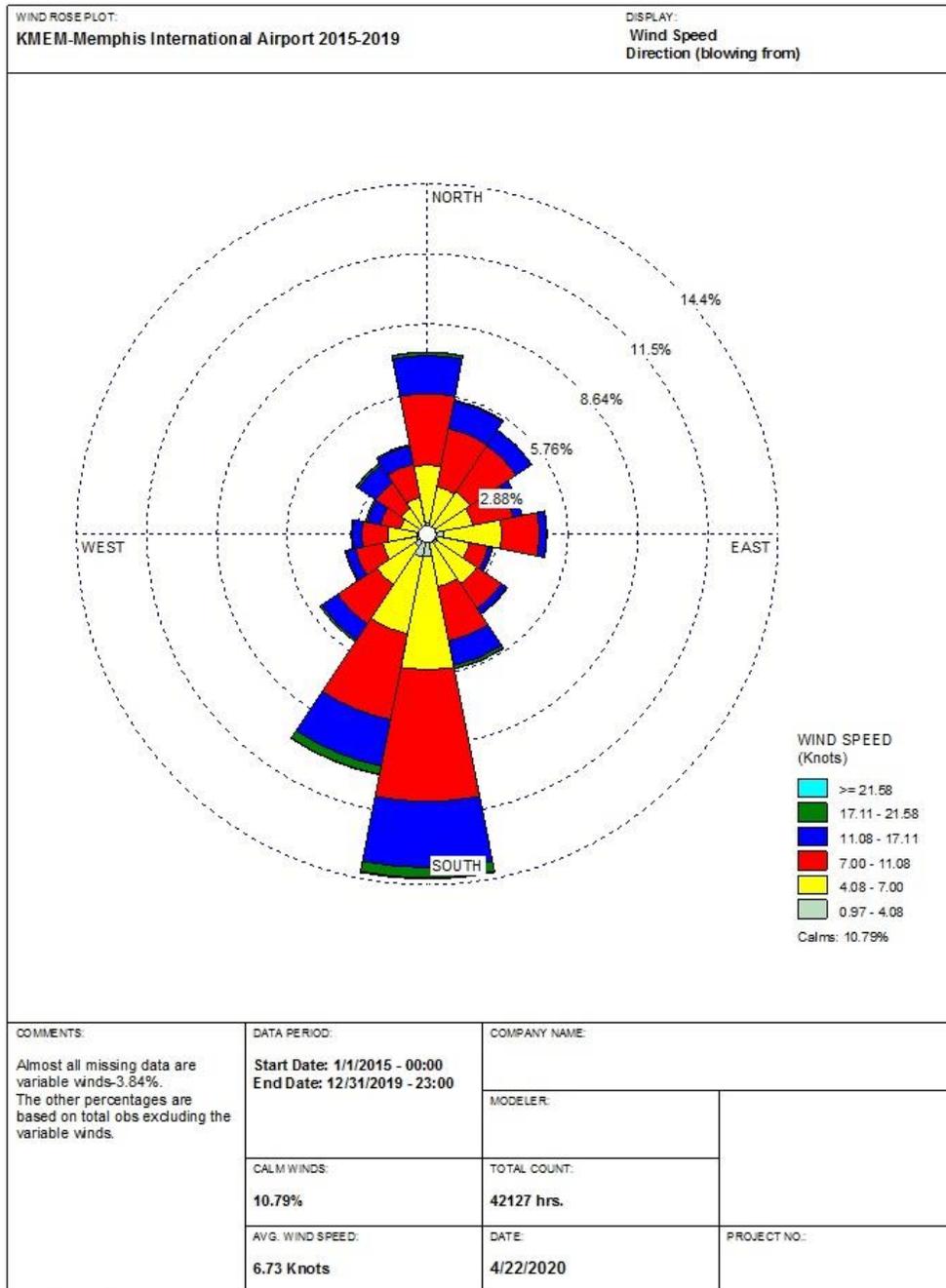
Edmund Orgill (West)



Edmund Orgill (Northwest)



V. Shelby County Climatology and Geography



Wind Rose for Memphis, TN-MS-AR MSA

Shelby County Geography

Shelby County, the largest county in area in Tennessee covers an area of 754.871 square miles or 483,117.44 acres (<http://cber.bus.utk.edu/census/cntyarea.pdf>). The 2018 population estimate (July 1, 2018) from the U.S. Census for Shelby County is 937,166

(<https://www.census.gov/quickfacts/fact/table/shelbycountytennessee,US/PST045218>). The elevation ranges from 185 above mean sea level (MSL) along the islands in the Mississippi River in the southern portion of the county to about 416 feet above MSL in the rolling hills of the southeastern area of Shelby County. Bluffs that are located in the western area of the county near the Mississippi River are derived from the wind-driven buildup of silt, sand, and clay known as loess, and are approximately 250 feet above MSL. The central region of the county is located on an ancient alluvial plain, a mostly flat area consisting of several layers of silt, sand, gravel, and clay, approximately 300-320 feet above MSL. The eastern area of the county consists of gentle, rolling hills, approximately 340-400 feet above MSL. Cities and towns within Shelby County include Memphis with a population of 650,618; Millington (10,685); Bartlett (59,315); Lakeland (12,617); Arlington (11,697); Collierville (50,616); and Germantown (39,099).

All city population estimates were from the year 2018 (2019 was not available) and were obtained using the QuickFacts Table from <http://www.census.gov/>

Shelby County Climatology

Like most of the Southeast U.S. and southern Mid-Atlantic states, Shelby County, TN falls within the humid subtropical climate zone (Cfa on the Köppen Climate Classification). This can be described as hot, humid summers with mild to cool winters. Using the latest 30-year climate data set (1981-2010) obtained by the National Climatic Data Center, the normal conditions are as follows:

Coldest Month: January (avg max temp=49.8 degrees; avg min temp=31.8 degrees)

Warmest Month: July (avg max temp=91.6 degrees; avg min temp=73.8 degrees)

Yearly Precipitation Normal: 53.68 inches (49.88 inches of rainfall and 3.8 inches of snowfall)

Wettest Months: November-December and March-May (avg of 5.49, 5.74 and 5.16, 5.5, and 5.25 inches, respectively)

Driest Months: August-September (avg of 2.88 and 3.09 inches, respectively)

Wind direction is most prevalent from the south to southwest (see wind rose data)

Most frontal activity occurs in the Spring and Autumn. Summer experiences lower humidity at the start of the season with higher humidity levels starting by early to mid-July as the Bermuda High pressure system pulls warm, moist air into the lower Mississippi Valley from the Gulf of Mexico. Localized thunderstorms are common in the afternoon. By September, the humidity begins to lower as the Bermuda high breaks down. Winters are usually mostly mild with periods of very cold air. Severe weather is most common in the Spring, but can occur any time of year.

VI. Local Programs Submittals of Ambient Monitoring Plan

Memphis Air Monitoring Plan

These documents are provided as submitted by the respective monitoring agency for use by the state in updating the overall ambient monitoring plan document.

A. Memphis Air Monitoring Plan

1. PM_{2.5} Collocation at Shelby Farms NCore site
2. PM₁₀ Collocation at Shelby Farms NCore site
3. PAMS at Shelby Farms NCore site
4. Teledyne T640 PM_{2.5} sampler at Southwest Tennessee Community College Near Road site
5. Teledyne T640x PM sampler at the Shelby Farms NCore site

B. Shelby County Air Pollution Active Sites 2020

C. 2019 Ambient Monitor and Auxillary Support Equipment Evaluation

A. Memphis Air Monitoring Plan

Shelby County Health Department Air Pollution Control Program

Network Review

2020

An assessment of the Shelby County Health Department's (SCHD) ambient air monitoring network has been conducted. The SCHD Air Monitoring Branch has evaluated each air monitoring site according to the requirements and provisions as required by the Code of Federal Regulations 40, Parts 50, 53, and 58 and have concluded that the number and locations of the monitors in our network comply with the CFR provisions. In some areas of the network, more monitors are operating than required. Therefore, the SCHD is forwarding the enclosed documents with the pertinent air monitoring site information so that the contents may be incorporated into the State of Tennessee's Monitoring Network plan to EPA.

Changes to our air monitoring network include the following:

1. PM_{2.5} Collocation at Shelby Farms NCore site

40 CFR 58.12 (d) (2) states that all FRMs at the NCore sites must minimally operate on a 1 in 3 day sampling frequency. This includes the collocated samplers. The SCHD AMB has operated 2 PM_{2.5} samplers at the Shelby Farms site location since February 2011. The POC 1 sampler operated on a 1 in 3 day sampling frequency. The POC 2 sampler operated on a 1 in 6 day sampling frequency but changed to a 1 in 3 day sampling schedule on July 2, 2019 to meet collocation requirements.

2. PM₁₀ Collocation at the Shelby Farms NCore site

Per 40 CFR Part 58 Appendix A 3.3.4 *Collocated Quality Control Sampling Procedures for Manual PM₁₀* states Collocated sampling for PM₁₀ is only required for manual samplers. For each pair of collocated monitors, designate one sampler as the primary monitor whose concentrations will be used to report air quality for the site and designated the other as the quality control monitor. Since the SCHD AMB has operated a low volume PM₁₀ FRM sampler to calculate PM_{10-2.5} beginning in January 2012, another PM₁₀ sampler will be operated at the NCore site to meet collocation requirements. The first sample day was July 8, 2019. This collocated sampler will report data at STP for parameter code 81102. This collocated quality control monitor operates on a 1 in 12 day sampling schedule.

3. PAMS at the Shelby Farms NCore site

Based on 40 CFR Part 58, Appendix D, State air monitoring agencies are required to begin making PAMS measurements at their NCore location(s) by June 1, 2019. The equipment needed to measure PAMS parameters were to be purchased by the USEPA using a nationally negotiated contract and delivered to the monitoring agencies. The USEPA has announced that due to contract delays, the necessary equipment will not be delivered in time to begin making PAMS measurements by June 1,

2019. An extension was granted and was effective on February 7, 2020 delaying the start date for PAMS monitoring to June 1, 2021. The revision gives the States two additional years to acquire the necessary equipment and expertise needed to successfully make the required PAMS measurements by the 2021 PAMS season. As a result of the delay, the Shelby County Health Department Air Monitoring Branch did not begin making PAMS measurements at the Shelby Farms NCore location in 2019 and will work with the EPA to begin measurements on or before the final revised start date for this network.

4. Teledyne T640 PM_{2.5} sampler at Southwest Tennessee Community College Near Road site

The SCHD AMB purchased a Teledyne T640 PM_{2.5} continuous light scattering instrument in December 2017. It is operated as a Special Purpose Monitor for continuous PM_{2.5} monitoring. It monitors for PM₁₀ also, but the data is not Federal Reference or Federal Equivalent. It is being run in conjunction with a Thermo Environmental 2025I sampler. The samplers will be collocated until the end of 2020. At the end of the 2020 sampling period, the T640 will be discontinued. The goal is to convert the instrument to a T640x depending on the budget.

5. Teledyne T640x PM sampler at the Shelby Farms NCore site

The SCHD AMB intends to purchase a Teledyne T640x PM sampler for the NCore site. This monitor will replace 3 of the FRM samplers at the site. A collocated PM_{2.5} sampler will remain at the site and will sample on a 1-in-3 day schedule. When the funding is available, a Teledyne T640x sampler will be purchased for the Alabama site and the T640 currently at Near Road will be converted to a Teledyne T640x. The Near Road and Alabama stations will continue to operate a FRM sampler and sample on a 1-in-3 day schedule. A collocated FRM sampler will be placed at the Alabama or Near Road station and will sample on a 1-in-12 day sampling schedule. But, the goal will be to have a T640x at all of the PM sites and collocate a FRM at the NCore station.

B. 2020 Shelby County Active Sites

Shelby County Health Department Active Sites	Pollutant	Monitor	AQS ID
416 Alabama	PM _{2.5} (1 in 3 day) PM ₁₀ continuous	Thermo Environmental 2025I Sequential and TEOM 1405	47-157-0024
6855 Mudville (Edmund Orgill Park)	O ₃ Continuous	Teledyne API	47-157-1004
1330 Frayser	O ₃ Continuous	Teledyne API	47-157-0021
6388 Haley Rd.	CO (Trace) Continuous SO ₂ (Trace) Continuous NO _y Continuous O ₃ Continuous PM ₁₀ (lo vol) (1 in 3 day) PM ₁₀ (lo vol) (1 in 12 day) PM _{10-2.5} (1 in 3 day) PM _{2.5} (1 in 3 day) PM _{2.5} Continuous PM _{2.5} Speciation (1 in 3 day) Carbon (1 in 3 day) Wind Speed Wind Direction Ambient Temperature Relative Humidity Barometric Pressure	Teledyne API Teledyne API Teledyne API Teledyne API R&P 2025 PM 10 R&P 2025 PM 2.5 R&P 2025 PM 2.5 R&P 2025 PM 2.5 R&P TEOM Met One Super SASS URG 3000 Met One Sonic Anemometer Met One Sonic Anemometer RM Young RM Young RM Young RM Young Climatronics	47-157-0075
5767 Haley Rd.	CO (Trace) Continuous NO ₂ (Trace) Continuous PM _{2.5} (1 in 3 day)	Teledyne API Teledyne API Thermo Environmental 2025I Sequential	47-157-0100

C. 2019 Ambient Monitor and Auxillary Support Equipment Evaluation

Site Location: 1330 Frayser Blvd.			
Make	Model	Serial Number	Condition
ESC	8832	A1571	Good
Teledyne Advanced Pollution Instrumentation	T400	1304	Good
Teledyne Advanced Pollution Instrumentation	T703	169	Good
Site Location: 416 Alabama			
Make	Model	Serial Number	Condition
Advanced Pollution Instrumentation	700	487	Good
ESC	8816	1264	Good
ESC	8832	A1567	Good
ESC	8816	3458	Good
ESC	8816	1267	Good
General Atomics	Radnet		Good
Graesby GMW	PM 10	2375	Good
Met One Instruments	SASS	Control Box B-1480	Good
Met One Instruments	SASS	Pump Box B2919	Good
Met One Instruments	SASS	Temperature Sensor	Good
Teledyne Advanced Pollution Instrumentation	T300	1539	Good
Thermo Environmental Instruments	2025I	20737	Good
Thermo Environmental Instruments	1405	1405A223701302	Good
URG	3000N	Module C 3N-B0847	Good
URG	3000N	Stand (Pump) 3N-B0630	Poor
URG	3000N	Controller 3N-B0690	Good
URG	3000N Stand (Pump)	3N-B0630	Good
Site Location: 6388 Haley Rd.			
Make	Model	Serial Number	Condition
Climatronics Omega	100093	Temperature Sensor/J2850C	Poor
Climatronics	102663	BP Sensor/43970	Good
ESC	8832	A-1578	Good
Kipp and Zonen	BD300	051518	Poor
Met One Instruments		50.5 Sonic Wind Sensor	Poor
Met One Instruments	SSASS	Control Box K16485	Good
Met One Instruments	SSASS	Pump Box K17956	Good
Met One Instruments	SASS	Sample Head K17985	Good
RM Young (Compacted Aspirated Radiation Shield)	43502		Good

Site Location: 6388 Haley Rd.			
Make	Model	Serial Number	Condition
RM Young (Wind Direction and Wind Speed)	05305	WM174800	Good
RM Young (Relative Humidity and Temperature)	41382V	174800	Good
Rupprecht & Pataschnick	1400A	1400AB231030006	Good
Rupprecht & Pataschnick	2025	20921	Good
Rupprecht & Pataschnick	2025	21802	Good
Sierra Instruments (Lead , HiVol)		02409620250	Good
Teledyne Advanced Pollution Instrumentation	400E	2664	Poor
Teledyne Advanced Pollution Instrumentation	T400	3521	Good
Teledyne Advanced Pollution Instrumentation	703E	297	Good
Teledyne Advanced Pollution Instrumentation	701H	80	Good
Teledyne Advanced Pollution Instrumentation	100EU	135	Good
Teledyne Advanced Pollution Instrumentation	300EU	246	Good
Teledyne Advanced Pollution Instrumentation	T200U	209	Good
Teledyne Advanced Pollution Instrumentation	700EU	88	Good
Teledyne Advanced Pollution Instrumentation	701H	1621	Good
Teledyne Advanced Pollution Instrumentation	501Y	104	Good
Teledyne Advanced Pollution Instrumentation	100E	236	Poor
Thermo Environmental Instruments	2025I	20353	Good
Thermo Environmental Instruments	2025I	20739	Good
Thermo Environmental Instruments	2025B	21908	Good
URG	3000N	Module C 3N-B0794	Good
URG	3000N	Controller 3N-B0742	Good
URG	3000N	Stand (Pump) 3N-B0592	Good
Vaisala		RH sensor/T25685	Good
Site Location: 5767 Macon Cv.			
Make	Model	Serial Number	Condition
ESC	8832	A4830K	Good
Teledyne Advanced Pollution Instrumentation	T700U	206	Good
Teledyne Advanced Pollution Instrumentation	T300U	174	Good
Teledyne Advanced Pollution Instrumentation	T200U	182	Good
Teledyne Advanced Pollution Instrumentation	701H	809	Good
Teledyne Advanced Pollution Instrumentation	T640	200	Good
Thermo Environmental Instruments	2025I	207401501	Good
Site Location: 6855 Mudville Rd.			
Make	Model	Serial Number	Condition
ESC	8832	A1570	Good
Teledyne Advanced Pollution Instrumentation	T400	1138	Good
Teledyne Advanced Pollution Instrumentation	T703	235	Good

Site Location: 814 Jefferson Ave. (Lab)			
Make	Model	Serial Number	Condition
Advance Pollution Instrumentation	701	1084	Poor
Advance Pollution Instrumentation	401	188	Good
Advance Pollution Instrumentation	400	733	Good
Advance Pollution Instrumentation	700	404	Good
Advance Pollution Instrumentation	401	227	Poor
Advance Pollution Instrumentation	400A	650	Good
Advance Pollution Instrumentation	701	644	Poor
Advance Pollution Instrumentation	401	253-S	Good
Advance Pollution Instrumentation	400A	459	Good
Boekel	Dricycler	124046600	Good
Climatronics	102663-2	BP Sensor / R23352	Good
Climatronics	102874	Sonic / T12878	Poor
Site Location: 814 Jefferson Ave. (Lab)			
Make	Model	Serial Number	Condition
Climatronics	100093	Temp Sensor / R19750	Poor
Dresser Roots Meter	5M125	8622376	Good
Enviroics	6103	3445	Poor
ESC	8832	A1568	Good
ESC	8832	A1569	Good
ESC	8872	795	Good
ESC	8816	1268	Good
Rupprecht & Pataschnick	2025	2025A209179811	Poor
Sartorius	Balance	40100003	Good
Teledyne Advanced Pollution Instrumentation	T400	631	Good
Teledyne Advanced Pollution Instrumentation	T400	1779	Good
Teledyne Advanced Pollution Instrumentation	T700	1800	Good
Teledyne Advanced Pollution Instrumentation	T400	312	Good
Teledyne Advanced Pollution Instrumentation	T400	3521	Good
Teledyne Advanced Pollution Instrumentation	701H	1622	Good
Teledyne Advanced Pollution Instrumentation	701H	113	Good
Teledyne Advanced Pollution Instrumentation	T750H	55	Good
Teledyne Advanced Pollution Instrumentation	751H	84	Good
Teledyne Advanced Pollution Instrumentation	300E	700	Poor
Thermo Environmental Instruments	2025I	203531302	Good
Troemner Class I Weights		38380	Good
Troemner Class I Weights		A125	Good
VWR Oven	89511-410	41747908	Good
Vaisala	102802	RH Sensor / T16788	Good

VII. Appendix

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Memorandum of Agreement for Memphis, TN-MS-AR.....	48



LEE HARRIS
MAYOR

SHELBY COUNTY HEALTH DEPARTMENT

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

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, 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 (PM₁₀), 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:

<u>County</u>	<u>Federal Referenced Method PM_{2.5}</u>	<u>Continuous PM_{2.5}</u>	<u>Speciation PM_{2.5}</u>	<u>Collocated PM_{2.5}</u>
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:

<u>County</u>	<u>PM₁₀</u>	<u>O₃</u>	<u>NO_x/NO/NO₂</u>	<u>CO</u>	<u>SO₂</u>
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.