

AMBIENT AIR MONITORING NETWORK REVIEW
2011

Regional Air Pollution Control Agency
117 South Main Street
Dayton, OH 45422



RAPCA'S ANNUAL AMBIENT AIR MONITORING NETWORK REVIEW
Public Review Draft 2011

The Regional Air Pollution Control Agency is committed to operating a quality-assured monitoring network that generates accurate measurements of ambient air quality in its jurisdiction. These monitoring data are used to measure progress toward attainment of EPA's National Ambient Air Quality Standards (NAAQS), assess source contributions to air pollution, and assist in the protection of public health. Please note that all data generated by RAPCA's ambient air quality monitoring network are public information, and are available by request from RAPCA, by visiting www.rapca.org or by visiting www.epa.gov/ttn/airs/airsaqs/detaildata/. Monitoring data are quality-assured and submitted to AQS in a timely fashion.

There are 18 ambient air quality monitors at 12 sites distributed over five counties in RAPCA's six-county jurisdiction. See Figure 1 and Table 1. Monitoring sites are selected based on a number of factors including computer modeling of atmospheric chemistry and air dispersion, population, access to power, security, and public interest. Five air pollutants (carbon monoxide, ozone, particulate matter, nitrogen oxides, and sulfur dioxide) are measured at the sites described below.

Figure 1. RAPCA Criteria Air Pollutant Monitoring Locations

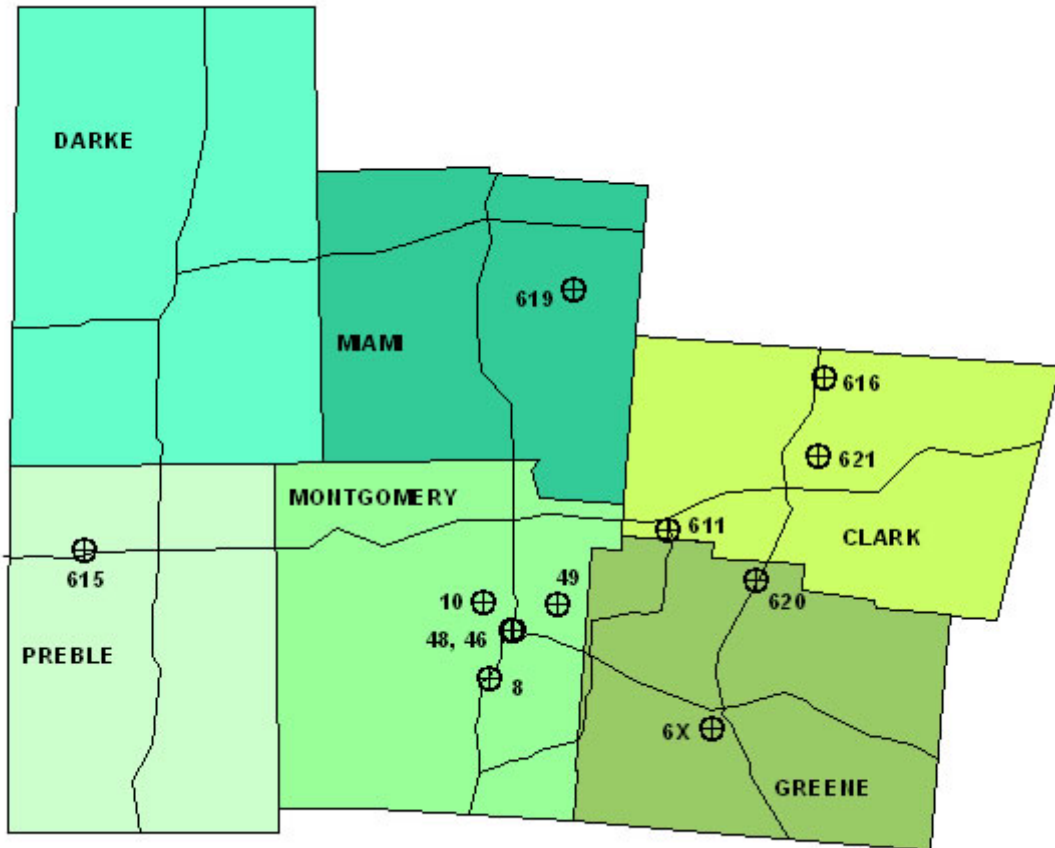


Table 1. Latitude/Longitude for RAPCA’s Monitoring Sites

Site number	Latitude	Longitude	AQS ID	Pollutant(s)
8	39.714167	-84.218056	39-113-7001	PM ₁₀
<i>10 (shutdown)</i>	<i>39.787222</i>	<i>-84.226111</i>	<i>39-113-0028</i>	<i>CO</i>
46	39.760278	-84.187778	39-113-0032	PM _{2.5}
48	39.757837	-84.191668	39-113-0034	CO
49	39.785034	-84.134402	39-113-0037	Ozone
611	39.855556	-83.997500	39-023-0003	Ozone, SO ₂
615	39.835556	-84.720833	39-135-1001	Ozone, PM _{2.5} , NCore
616	40.000833	-83.804444	39-023-0001	Ozone
619	40.084722	-84.114722	39-109-0005	Ozone
620	39.808056	-83.886944	39-057-0005	PM _{2.5} , PM ₁₀
621	39.928889	-83.809722	39-023-0005	PM _{2.5}
6X	39.665556	-83.943333	39-057-0006	Ozone

CO MONITORING SITES

The NAAQS for carbon monoxide (CO) is 9 ppmv for an 8-hour average and 35 ppmv for a one-hour average. We are in attainment of the air quality standard for this air pollutant. CO is measured using the “gas filter correlation” technique to determine the CO concentration. In this method, ambient air is drawn into a chamber and exposed to infrared radiation. The CO gas in the ambient air sample is sensitive to this radiation and will absorb a portion of the beam’s energy. The instrument then determines the amount of energy transmitted through the air sample and compares it to the amount of energy transmitted through an optically filtered air sample. The CO concentration in the ambient air sample drawn through the analyzer can then be determined through ratio linearization.

Site 10 **39-113-0028 FROC** (Fair River Oaks Council) located at 901 West Fairview Avenue northwest of downtown Dayton in Montgomery County. At this site we monitor CO to assess population exposure to the pollutant. We have monitored at this location since 1981, and currently use a Thermo 48i analyzer (www.thermo.com). Due to the City of Dayton (building owner) disposition of the property, this site was shutdown on July 01, 2011.

Site 48 **39-113-0034 REIBOLD BUILDING** located at 117 South Main Street in downtown Dayton. At this site we monitor CO to measure the anticipated highest concentration in our jurisdiction. We have monitored at this location since 2004 (replacing the Centre City site 39-113-0003), and currently use a Thermo 48i analyzer (www.thermo.com). Our plan for this site involves no changes at this time.

Site 615 **39-135-1001 NATIONAL TRAIL HIGH SCHOOL** located at 6940 Oxford Gettysburg Road, New Paris in Preble County. This is a NCore requirement and we use an EcoTech EC9830T since January 1, 2011.

OZONE MONITORING SITES

The NAAQS for ozone (O₃) is 0.075 ppmv for an eight-hour average (tightened in 2008). We have been redesignated to attainment of the (previous) air quality standard for this air pollutant. However, monitoring data currently show that we are likely to be nonattainment for a new, tighter standard due to be proposed in July 2011. The measurement technique used is ultraviolet (UV) photometry and is based on the fact that ozone absorbs ultraviolet light of specific wavelengths. With the UV photometry method, an air sample is diverted into a catalytic converter which changes any ozone present into oxygen. This sample is then passed through the absorption chamber to determine the amount of UV light passed through it to serve as a reference. A second sample is then introduced into the absorption chamber and the amount of UV light passed through it is also measured, (which will be a reduced amount because ozone absorbs UV). The difference between the two values represents the amount of ozone present. This method generates 1-hour average ozone measurements in real-time mode. These up-to-the-hour measurements are available on the RAPCA website during ozone season (www.rapca.org).

Site 616 **39-023-0001 SPRINGFIELD** located at 5171 Urbana Road, Springfield in Clark County downwind of Dayton and just north of Springfield. At this site we monitor ozone to measure the anticipated highest concentration in our jurisdiction. We have monitored at this location since 1977, and currently use a Thermo 49C analyzer (www.thermo.com). Our plan for this site involves no changes at this time.

Site 611 **39-023-0003 MUD RUN** located at 5400 Spangler Road, Enon in Clark County downwind of Dayton and just northeast of Fairborn. At this site we monitor ozone to measure the anticipated highest concentration in our jurisdiction. We have monitored at this location since 1985, and currently use a Thermo 49i analyzer (www.thermo.com). Our plan for this site involves no changes at this time. Note that we also monitor SO₂ at this site.

Site 6X **39-057-0006 XENIA GOVERNMENT CENTER** located at 541 Ledbetter Road, Xenia in Greene County due east of Dayton. At this site we monitor ozone to measure the anticipated highest concentration in our jurisdiction. We have monitored at this location since 1997, and currently use a Thermo 49i analyzer (www.thermo.com). Our plan for this site involves no changes at this time.

Site 619 **39-109-0005 MIAMI EAST HIGH SCHOOL** located at 3825 North State Route 589, Casstown in Miami County north and east of Dayton. At this site we monitor ozone to measure the anticipated highest concentration in our jurisdiction. We have monitored at this location since 1993, and currently use a Thermo 49C analyzer (www.thermo.com). Our plan for this site involves no changes at this time.

Site 49 **39-113-0037 EASTWOOD METROPARK** located at 1401 Harshman Road replaces the Claridge ozone site (Site 47, 39-113-0033). We moved from Claridge in the Spring of 2008 due to unanticipated building contamination issues. The new

Eastwood MetroPark site is located east of Dayton in Montgomery County. At this site we monitor ozone to assess population exposure to the pollutant. We have monitored at this location since May 2008, and currently use a Thermo 49i analyzer (www.thermo.com). Our plan for this site involves no changes at this time.

Site 615 39-135-1001 NATIONAL TRAIL HIGH SCHOOL located at 6940 Oxford Gettysburg Road, New Paris in Preble County. At this site we monitor ozone to assess upwind background concentrations of the pollutant. We have monitored at this location since 1976, and currently use a Thermo 49C analyzer (www.thermo.com). Due to NCore requirements, we monitor ozone year-round. Note that we also monitor PM_{2.5} at this site. We have established a rural NCore site at National Trail High School. Beginning in 2011, we monitor for the following additional pollutants: SO₂ (trace), CO (trace), and NO_y (trace), PM_{2.5} speciation, PM_{10-2.5}, and the meteorological parameters wind speed, wind direction, relative humidity, ambient temperature, solar radiation, and barometric pressure.

PM₁₀ MONITORING SITES

The NAAQS for particulate matter - 10 microns or less (PM₁₀) is 150 ug/m³ for a 24-hour average. We are in attainment of the air quality standard for this air pollutant. PM₁₀ is measured using a gravimetric filter-based technique, and generates 24-hour average PM₁₀ concentration data on a 1 in 6 day schedule. Due to the nature of the method, these data are not available in real-time mode.

Site 8 39-113-7001 MORaine FIREHOUSE located at 2738 Viking Lane, Moraine in Montgomery County. At this site we monitor PM₁₀ to measure the anticipated highest concentration in our jurisdiction. We have monitored at this location since 1984, and currently use an Andersen Instruments model 1200 high volume sampler, collocated with a second PM₁₀ sampler for precision evaluation. We plan to install two total suspended particulate (TSP) monitors to measure lead concentrations in ambient air at this location for comparison to the new NAAQS for lead (0.15 ug/m³). These monitors should be operational in late 2011.

Site 615 39-135-1001 NATIONAL TRAIL HIGH SCHOOL located at 6940 Oxford Gettysburg Road, New Paris in Preble County. This is a NCore requirement and we use a Thermo 2025 Partisol sampler on a 1-in-3 day schedule. This is a PM₁₀-LC sampler which is also used to calculate the difference channel (PM_{10-2.5} or PM_{coarse}).

Site 620 39-057-0005 YELLOW SPRINGS GOVERNMENT OFFICES located at 100 Dayton Street, Yellow Springs in Greene County. At this site we monitor PM₁₀ to assess population exposure to the pollutant. We have monitored at this location since 1997, and currently use a Wedding & Associates model 600 high volume sampler. Our plan for this site involves no changes at this time. Note that we also monitor PM_{2.5} at this site.

PM_{2.5} MONITORING SITES

The NAAQS for particulate matter – 2.5 microns or less (PM_{2.5}) is 15.0 ug/m³ annual arithmetic mean and 35 ug/m³ for a 24-hour average. We are not in attainment of the air quality standard for this air pollutant. In RAPCA jurisdiction, PM_{2.5} is measured using two different techniques. The older gravimetric filter-based technique (using the Reference Ambient Air Sampler, or Thermo RAAS model 2.5-300) has been designated a “federal reference method (FRM),” and generates 24-hour average PM_{2.5} concentration data on a 1 in 3 day schedule. Due to the nature of the method, these data are not available in real-time mode. Four BGI filter-based single-channel FRM PM_{2.5} samplers have been deployed at the Springfield and Yellow Springs sites, replacing the Thermo RAAS units. Due to the single-channel design of the BGI sampler, it requires two BGIs to replace one 1 in 3 day RAAS sampler. We deployed three Thermo 2025 Partisol samplers at the Dayton Library and National Trail High School sites, replacing the Thermo RAAS samplers. The second technique is based on the principle of beta particle attenuation by PM_{2.5} deposited on a tape (Synchronized Hybrid Ambient Real-time Particulate, or Thermo SHARP model 5030). A carbon-14 source emits beta particles which are absorbed by the particulate matter deposited on the tape. More absorption corresponds to higher PM_{2.5} concentrations. This method generates 1-hour average PM_{2.5} measurements in real-time mode. These up-to-the-hour measurements are available on the RAPCA website (www.rapca.org).

Site 46 **39-113-0032 DAYTON PUBLIC LIBRARY** located at 215 East Third Street, Dayton in Montgomery County. At this site we monitor PM_{2.5} to measure the anticipated highest concentration in our jurisdiction. We have measured PM_{2.5} at this site since 2001. We operate a 1 in 3 day Thermo 2025 Partisol sampler collocated with a 1 in 6 day Thermo 2025 Partisol sampler for precision evaluation. We operate a continuous SHARP PM_{2.5} unit at this site as well. We also operate a Met One SASS for speciated PM_{2.5}. Analytes for speciated PM_{2.5} include nitrate, sulfate, ammonium, organic carbon, elemental carbon, and a wide array of trace elements. In addition to the Met One unit we operate a URG 3000N PM_{2.5} carbon speciation sampler. This site is also home to our pollen and mold sampler.

Site 621 **39-023-0005 SPRINGFIELD FIREHOUSE** located at 350 North Fountain Avenue, Springfield in Clark County. At this site we monitor PM_{2.5} to assess population exposure to the pollutant. We have measured PM_{2.5} at this site since 2000. We currently operate two 1 in 3 day BGI FRM samplers and a continuous SHARP. Our plan for this site involves no changes at this time.

Site 620 **39-057-0005 YELLOW SPRINGS GOVERNMENT OFFICES** located at 100 Dayton Street, Yellow Springs in Greene County. At this site we monitor PM_{2.5} to assess population exposure to the pollutant. We have measured PM_{2.5} at this site since 2003. We currently operate two 1 in 3 day BGI FRM samplers and a continuous SHARP. Note that we also monitor PM₁₀ at this site.

Site 615 **39-135-1001 NATIONAL TRAIL HIGH SCHOOL** located at 6940 Oxford Gettysburg Road, New Paris in Preble County. At this upwind background site we monitor PM_{2.5} to assess regional transport of the pollutant. We have measured PM_{2.5} at this site since 2000. We currently operate a 1 in 3 day Thermo 2025 Partisol sampler and a continuous SHARP. We operate a Met One SASS for speciated PM_{2.5}. Analytes for speciated PM_{2.5} include nitrate, sulfate, ammonium, organic carbon, elemental carbon, and a wide array of trace elements. In addition to the Met One unit we operate a URG 3000N PM_{2.5} carbon speciation sampler. Note that we also monitor ozone at this site. We have established a rural NCore site at National Trail High School. Beginning January 01, 2011, we monitor the following additional NCore pollutants: SO₂ (trace), CO (trace) and NO_y (trace), PM_{2.5} speciation, PM_{10-2.5}, and the meteorological parameters wind speed, wind direction, relative humidity, ambient temperature, solar radiation, and barometric pressure.

SO₂ MONITORING SITES

The NAAQS for sulfur dioxide (SO₂) is 0.03 ppmv annual arithmetic mean and 0.14 ppmv for a 24-hour average. We are in attainment of the air quality standard for this air pollutant. SO₂ is measured using a fluorescent light principle of detection. This method exposes the SO₂ molecules to UV light which then give off a characteristic radiation as the SO₂ molecules return to their normal state. The intensity of this radiation provides a continuous direct measure of the concentration of SO₂ in the sample.

Site 611 **39-023-0003 MUD RUN** located at 5400 Spangler Road, Enon in Clark County downwind of Dayton and just northeast of Fairborn. At this site we monitor SO₂ to assess population exposure to the pollutant. We have monitored at this location since 1985, and currently use a Thermo 43i analyzer (www.thermo.com). Our plan for this site involves no changes at this time. Note that we also monitor ozone at this site.

Site 615 **39-135-1001 NATIONAL TRAIL HIGH SCHOOL** located at 6940 Oxford Gettysburg Road, New Paris in Preble County. This is a NCore requirement and we use an EcoTech EC9850T since January 1, 2011.

NO_y/NO MONITORING SITES

Site 615 **39-135-1001 NATIONAL TRAIL HIGH SCHOOL** located at 6940 Oxford Gettysburg Road, New Paris in Preble County. This is a NCore requirement and we use an EcoTech EC9841T since January 1, 2011.

MONITORING NETWORK CHANGES

Changes to our monitoring network discussed in detail above include:

Installed and began to operate a rural NCore site at National Trails in Preble County. An equipment vendor has been selected and was set up in 2010. The NCore data began collecting on January 1, 2011. We began operating a PMcoarse collocated sampler on April 1, 2011.

In 2008 the NAAQS for lead was tightened to 0.15 ug/m^3 rolling 3-month average (from 1.5 ug/m^3 quarterly average). The new standard requires ambient monitoring in the Dayton area. First it was required that we perform lead monitoring at our rural NCore site but our alternative monitoring site request was approved by Region 5. We will be purchasing, installing and operating two TSP monitors at Moraine Firehouse, located in a mixed urban/industrial location. These TSP monitors will begin operating in late 2011. This will be the first lead NAAQS monitoring in the Dayton area since the late 1990's.

We shut down Site 10 FROC (39-113-0028) due to building disposition. No exceedances of the CO NAAQS were monitored at this site back to the commencement of monitoring there in the early 1980's.

In the future, we anticipate the promulgation of a $\text{PM}_{10-2.5}$ (PM coarse) standard. It is our plan to evaluate our monitoring network needs as the new or tighter NAAQS are proposed.

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