ALBUQUERQUE-BERNALILLO COUNTY
AIR QUALITY PROGRAM
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40 CFR Part 58 – Network Design Criteria for Ambient Air Quality[1]

Appendix E: Probe and Monitoring Path Siting Criteria for Ambient Air Quality Monitoring.

Probes and manifolds must be placed to avoid introducing bias to the sample. Important considerations are probe height above the ground, probe length (for horizontal probes), and physical influences near the probe.

Some general guidelines for probe and manifold placement are:

- Probes should not be placed next to air outlets such as exhaust fan openings
- Horizontal probes must extend beyond building overhangs
- Probes should not be near physical obstructions such as chimneys which affect the air flow in the vicinity of the probe
- Probes need to be accessible for performance evaluation auditors
- Height of the probe above the ground depends on the pollutant being measured
- Design of the probe system should be such that both analyzer and calibrator exhaust are vented outside for safety reasons

1. **Horizontal and Vertical Placement** - The probe or at least 80% of the monitoring path must be located between 2 and 15 meters above ground level for all Ozone (O_3) and Sulfur Dioxide (SO_2) monitoring sites, and for neighborhood or larger spatial scale, particles that are 10 microns or smaller (PM_{10}), particles that are smaller than 10 microns and larger than 2.5 microns ($PM_{10-2.5}$), particles that are 2.5 microns or smaller ($PM_{2.5}$), Nitrogen Dioxide (NO_2), and Carbon Monoxide (CO) sites. The probe or a significant portion of the monitoring path must be at least 1 meter vertically or horizontally away from any supporting structure, walls, parapets, etc. and away from dusty or dirty areas.
2. **Spacing from Minor Sources** – It is important to understand the monitoring objectives for a particular location in order to interpret this particular requirement. If a monitoring site is to be used to determine air quality such as a neighborhood or city, a monitoring agency should avoid placing a monitor probe, path, or inlet near local, minor sources. The plume from the local minor sources should not be allowed to inappropriately impact the air quality data collected at a site. Particulate matter sites should not be located in an unpaved area unless there is vegetative ground cover year-round, so that the impact of windblown dusts will be kept to a minimum. To minimize potential interferences, the probe or at least 90 percent of the monitoring path must be away from furnace and incineration flues or other sources of SO_2 or NO.
3. **Spacing from Obstructions** – To avoid interferences from buildings and other obstacles, the probe, inlet, or at least 90% of the monitoring path must have unrestricted airflow and be located away from obstacles. The distance from the obstacle to the probe must be at least twice the height of the obstacle that protrudes above the probe, inlet, or monitoring path. For particle sampling, a minimum of 2 meters of separation from walls, parapets, and structures is required for rooftop site placement.
4. **Spacing from Trees** – To reduce possible interference/obstruction, the probe, inlet, or at least 90 percent of the monitoring path must be at least 10 meters or further from the drip line of trees.

[1] https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-58/appendix-Appendix%20E%20to%20Part%2058

5. **Spacing from Roadways** – Spacing from roadways requirement is complex and is dependent on the type of pollutant and the average daily traffic (vehicles per day).
6. **Cumulative Interferences on a Monitoring Path** – The cumulative length or portion of a monitoring path that is affected by minor sources, trees, or roadways must not exceed 10 percent of the total monitoring path length.
7. **Maximum Monitoring Path Length** – The monitoring path length is dependent on the monitoring scale (neighborhood, middle, urban, regional scale). In areas subject to frequent period of dust, fog, rain, or snow, consideration should be given to a shortened monitoring path length to minimize loss of data due to these temporary optical obstructions.
8. **Probe Material and Pollutant Sample Residence Time** – For reactive gases (SO_2, NO_2, and O_3) special probe material must be used for point analyzers. Sample residence time should be less than 20 seconds.

The table below summaries the siting criteria for each pollutant. This table was taken from the Quality Assurance Handbook for Air Pollutant Measurement Systems, Volume II, January 2017.

Table E-4 of Appendix E to Part 58 - Summary of Probe and Monitoring Path Siting Criteria

Pollutant	Scale (maximum monitoring path length, meters)	Height from ground to probe, inlet or 80% of monitoring path[1] (meters)	Horizontal and vertical distance from supporting structures[2] to probe, inlet or 90% of monitoring path[1] (meters)	Distance from trees to probe, inlet or 90% of monitoring path[1] (meters)	Distance from roadways to probe, inlet or monitoring path[1] (meters)
SO_2[3 4 5 6]	Middle (300 m) Neighborhood Urban, and Regional (1 km)	2-15	>1	>10	N/A.
CO[4 5 7]	Micro [downtown or street canyon sites], micro [near-road sites], middle (300 m) and Neighborhood (1 km)	2.5-3.5; 2-7; 2-15	>1	>10	2-10 for downtown areas or street canyon microscale; ≤50 for near-road microscale; see Table E-2 of this appendix for middle and neighborhood scales.

Pollutant	Scale (maximum monitoring path length, meters)	Height from ground to probe, inlet or 80% of monitoring path[1] (meters)	Horizontal and vertical distance from supporting structures[2] to probe, inlet or 90% of monitoring path[1] (meters)	Distance from trees to probe, inlet or 90% of monitoring path[1] (meters)	Distance from roadways to probe, inlet or monitoring path[1] (meters)
O_3[3 4 5]	Middle (300 m) Neighborhood, Urban, and Regional (1 km)	2-15	>1	>10	*See* Table E-1 of this appendix for all scales.
NO_2[3 4 5]	Micro (Near-road [50-300 m])	2-7 (micro);	>1	>10	≤50 for near-road micro-scale.
	Middle (300 m)	2-15 (all other scales)			
	Neighborhood, Urban, and Regional (1 km)				*See* Table E-1 of this appendix for all other scales.
Ozone precursors (for PAMS)[3 4 5]	Neighborhood and Urban (1 km)	2-15	>1	>10	*See* Table E-4 of this appendix for all scales.
PM, Pb[3 4 5 8]	Micro, Middle, Neighborhood, Urban and Regional	2-7 (micro); 2-7 (middle $PM_{10-2.5}$); 2-7 for near-road;	>2 (all scales, horizontal distance only)	>10 (all scales)	2-10 (micro); *see* Figure E-1 of this appendix for all

Pollutant	Scale (maximum monitoring path length, meters)	Height from ground to probe, inlet or 80% of monitoring path[1] (meters)	Horizontal and vertical distance from supporting structures[2] to probe, inlet or 90% of monitoring path[1] (meters)	Distance from trees to probe, inlet or 90% of monitoring path[1] (meters)	Distance from roadways to probe, inlet or monitoring path[1] (meters)
		2-15 (all other scales)			other scales. ≤50 for near-road.

N/A - Not applicable.

[1] Monitoring path for open path analyzers is applicable only to middle or neighborhood scale CO monitoring, middle, neighborhood, urban, and regional scale NO_2 monitoring, and all applicable scales for monitoring SO_2, O_3, and O_3 precursors.

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

[3] Should be greater than 20 meters from the dripline of tree(s) and must be 10 meters from the dripline when the tree(s) act as an obstruction.

[4] Distance from sampler, probe, or 90 percent of monitoring path to obstacle, such as a building, must be at least twice the height the obstacle protrudes above the sampler, probe, or monitoring path. Sites not meeting this criterion may be classified as middle scale (*see* text).

[5] Must have unrestricted airflow 270 degrees around the probe or sampler; 180 degrees if the probe is on the side of a building or a wall.

[6] The probe, sampler, or monitoring path should be away from minor sources, such as furnace or incineration flues. The separation distance is dependent on the height of the minor source's emission point (such as a flue), the type of fuel or waste burned, and the quality of the fuel (sulfur, ash, or lead content). This criterion is designed to avoid undue influences from minor sources.

[7] For micro-scale CO monitoring sites, the probe must be >10 meters from a street intersection and preferably at a midblock location.

[8] Collocated monitors must be within 4 meters of each other and at least 2 meters apart for flow rates greater than 200 liters/min or at least 1 meter apart for samplers having flow rates less than 200 liters/min to preclude airflow interference, unless a waiver is in place as approved by the Regional Administrator pursuant to section 3 of Appendix A.