appendix D of this part. The pollutantspecific probe and monitoring path siting criteria generally apply to all spatial scales except where noted otherwise. Specific siting criteria that are phrased with a "must" are defined as requirements and exceptions must be approved through the waiver provisions. However, siting criteria that are phrased with a "should" are defined as goals to meet for consistency but are not requirements.

2. Sulfur dioxide (SO<sub>2</sub>), Ozone (O<sub>3</sub>), and Nitrogen Dioxide (NO<sub>2</sub>)

Open path analyzers may be used to measure SO<sub>2</sub>, O<sub>3</sub>, and NO<sub>2</sub> at SLAMS/ NAMS sites for middle, neighborhood, urban, and regional scale measurement applications. Additional information on SO<sub>2</sub>, NO<sub>2</sub>, and O<sub>3</sub> monitor siting criteria may be found in references 11 and 13.

## 2.1 Horizontal and Vertical Placement

The probe or at least 80 percent of the monitoring path must be located between 3 and 15 meters above ground level. The probe or at least 90 percent of the monitoring path must be at least 1 meter vertically or horizontally away from any supporting structure, walls, parapets, penthouses, etc., and away from dusty or dirty areas. If the probe or a significant portion of the monitoring path is located near the side of a building, then it should be located on the windward side of the building relative to the prevailing wind direction during the season of highest concentration potential for the pollutant being measured.

2.2 Spacing from Minor Sources (Applicable to  $SO_2$  and  $O_3$  Monitoring Only)

Local minor sources of SO<sub>2</sub> can cause inappropriately high concentrations of SO<sub>2</sub> in the vicinity of probes and monitoring paths for SO<sub>2</sub>. Similarly, local sources of nitric oxide (NO) and ozone-reactive hydrocarbons can have a scavenging effect causing unrepresentatively low concentrations of O<sub>3</sub> in the vicinity of probes and monitoring paths for  $O_3$ . To minimize these potential interferences, the probe or at least 90 percent of the monitoring path must be away from furnace or incineration flues or other minor sources of  $SO_2$  or NO, particularly for open path analyzers because of their potential for greater exposure over the area covered by the monitoring path. The separation distance should take into account the heights of the flues, type of waste or fuel burned, and the sulfur content of the fuel. It is acceptable, however, to monitor for SO<sub>2</sub> near a point source of SO<sub>2</sub> when the objective

is to assess the effect of this source on the represented population.

## 2.3 Spacing From Obstructions

Buildings and other obstacles may possibly scavenge SO<sub>2</sub>, O<sub>3</sub>, or NO<sub>2</sub>. To avoid this interference, the probe or at least 90 percent of the monitoring path must have unrestricted airflow and be located away from obstacles so that the distance from the probe or monitoring path is at least twice the height that the obstacle protrudes above the probe or monitoring path. Generally, a probe or monitoring path located near or along a vertical wall is undesirable because air moving along the wall may be subject to possible removal mechanisms. A probe must have unrestricted airflow in an arc of at least 270 degrees around the inlet probe, or 180 degrees if the probe is on the side of a building. This arc must include the predominant wind direction for the season of greatest pollutant concentration potential. A sampling station having a probe located closer to an obstacle than this criterion allows should be classified as middle scale rather than neighborhood or urban scale, since the measurements from such a station would more closely represent the middle scale. A monitoring path must be clear of all trees, brush, buildings, plumes, dust, or other optical obstructions, including potential obstructions that may move due to wind, human activity, growth of vegetation, etc. Temporary optical obstructions, such as rain, particles, fog, or snow, should be considered when siting an open path analyzer. Any of these temporary obstructions that are of sufficient density to obscure the light beam will affect the ability of the open path analyzer to continuously measure pollutant concentrations.

Special consideration must be devoted to the use of open path analyzers due to their inherent potential sensitivity to certain types of interferences, or optical obstructions. While some of these potential interferences are comparable to those to which point monitors are subject, there are additional sources of potential interferences which are altogether different in character. Transient, but significant obscuration of especially longer measurement paths could be expected to occur as a result of certain prevailing meteorological conditions (e.g., heavy fog, rain, snow) and/or aerosol levels that are of a sufficient density to prevent the open path analyzer's light transmission. If certain compensating measures are not otherwise implemented at the onset of monitoring (e.g., shorter path lengths, higher light source intensity), data

recovery during periods of greatest primary pollutant potential could be compromised. For instance, if heavy fog or high particulate levels are coincident with periods of projected NAAQSthreatening pollutant potential, the representativeness of the resulting data record in reflecting maximum pollutant concentrations may be substantially impaired despite the fact that the site may otherwise exhibit an acceptable, even exceedingly high overall valid data capture rate.

In seeking EPA approval for inclusion of a site using an open path analyzer into the formal SLAMS/NAMS or PSD network, monitoring agencies must submit an analysis which evaluates both obscuration potential for a proposed path length for the subject area and the effect this potential is projected to have on the representativeness of the data record. This analysis should include one or more of the following elements, as appropriate for the specific circumstance: climatological information, historical pollutant and aerosol information, modeling analysis results, and any related special study results.

## 2.4 Spacing From Trees

Trees can provide surfaces for SO<sub>2</sub>,  $O_3$ , or NO<sub>2</sub> adsorption or reactions and obstruct wind flow. To reduce this possible interference, the probe or at least 90 percent of the monitoring path should be 20 meters or more from the drip line of trees. If a tree or trees could be considered an obstacle, the probe or 90 percent of the monitoring path must meet the distance requirements of Section 2.3 and be at least 10 meters from the drip line of the tree or trees. Since the scavenging effect of trees is greater for O<sub>3</sub> than for other criteria pollutants, strong consideration of this effect must be given to locating an O<sub>3</sub> probe or monitoring path to avoid this problem.

## 2.5 Spacing From Roadways (Applicable to O<sub>3</sub> and NO<sub>2</sub> Only)

In siting an  $O_3$  analyzer, it is important to minimize destructive interferences from sources of NO, since NO readily reacts with O<sub>3</sub>. In siting NO<sub>2</sub> analyzers for neighborhood and urban scale monitoring, it is important to minimize interferences from automotive sources. Table 1 provides the required minimum separation distances between a roadway and a probe and between a roadway and at least 90 percent of a monitoring path for various ranges of daily roadway traffic. A sampling station having a point analyzer probe located closer to a roadway than allowed by the Table 1 requirements