1.4.6 PRETEST PREPARATION

1.4.6.1 ABSTRACT

1. A common practice in both ambient air monitoring and stationary source emission monitoring includes pretest preparation for a new project. The proper selection of sampling sites and probe siting in ambient monitoring is fundamental in providing high quality and representative monitoring data. These activities are described in further detail in Volumes II and III and in References 1 and 2.

2. The pretest activities most important in ambient air monitoring system design are:

a. Monitoring network size.
b. Sampling station location.
c. Probe siting.
d. Method/equipment selection.

3. The pretest activities most important in stationary source emission monitoring system design are:

a. Process design and operation familiarity.

b. Measurements performed to gather data for design of the sample collection program.

c. Monitoring of process to determine representative conditions of operation.

1.4.6.2 DISCUSSION

A common practice in both ambient air monitoring and stationary source emission monitoring includes pretest preparation for a new project. During the pretest preparation, an on-site visit may be conducted in order to complete administrative details for sample collection and to gather technical information for monitoring system design.

Ambient air monitoring system design - Factors that could be considered during ambient air monitoring system design are discussed in Volume II and in References 1 and 2. The items most important during the pretest preparation are summarized here.

1. Monitoring network size. The design of the monitoring network depends on the objective of the project. The objective is normally one of the following: compliance monitoring, emergency episode monitoring, trend monitoring, or research monitoring. In considering the location of the network, one or more of the following will be important considerations: monitoring must be pollution oriented; monitoring must be population oriented; monitoring must be source oriented; and/or monitoring must provide area-wide representation of air quality.

Criteria should be provided for new project monitoring network design. By way of example, criteria for design of the NAMS network for TSP and SO_2 are shown in Table 1.4.6.1. Table 1.4.6.2 shows the NAMS requirements for CO, O_3, and NO_2.

2. Sampling station location. The location of sampling stations within a monitoring network is influenced primarily by meteorological and topographic restraints. Meteorology (wind direction and speed) not only affect the geographical location of the sampling station but also the height of the sampling probe or sampler. Topographic features that have the greatest influence on final sampling station location are physical obstructions in the immediate area that may alter air flows, (e.g., trees, fences, and buildings). Criteria should be provided for sampling station location for new projects.

Providing project criteria for network and station design before the on-site inspection is an important factor in the success of the project and in the quality and representativeness of the data. Table 1.4.6.3 summarizes the probe siting criteria in Reference 2.

TABLE 1.4.6.1. SO_2 AND TSP NATIONAL AIR MONITORING STATION (NAMS) CRITERIA (Approximate number of stations/area)[a]

Population category	Concentration: High[b]		Medium[c]		Low[d]	
	SO_2	TSP	SO_2	TSP	SO_2	TSP
High (>500,000)	6-8	6-8	4-6	4-6	0-2	0-2
Medium (100,000-500,000)	4-6	4-6	2-4	2-4	0-2	0-2
Low (50,000-100,000)	2-4	2-4	1-2	1-2	0	0

[a]This table is based on Reference 1. Urban areas and the number of stations/area will be jointly selected by EPA and the State agency.

[b]High concentration: SO_2 violating primary NAAQS; TSP violating primary NAAQS by $\geq$20 percent.

[c]Medium concentration: SO_2 violating 60 percent of primary NAAQS; TSP violating secondary NAAQS.

[d]Low concentration: SO_2 <60 percent of primary NAAQS; TSP less than secondary NAAQS.

TABLE 1.4.6.2. CO, O_3, AND NO_2 NAMS CRITERIA[a]

Pollutant	Criteria
CO	Two stations per major urban area: (1) one in a peak conc area (micro scale), (2) one in a neighborhood where conc exposures are significant neighborhood scale).
O_3	Two O_3 NAMS in each urban area having a population $\geq$200,000. (1) one representative of maximum O_3 conc (urban scale), (2) one representative of high density population areas on the fringe of central business districts.
NO_2	Two NO_2 NAMS in area having a population >1,000,000. (1) one where emission density is highest (urban scale), (2) one downwind of the area of peak NO_x emissions.

[a]This table is based on Reference 1.

TABLE 1.4.6.3. SUMMARY OF PROBE SITING CRITERIA[2]

Pollutant	Scale	Height above ground, meters	Distance from supporting structure, meters		Other spacing criteria
			Vert	Horiz[a]	
TSP	All	2 - 15	--	>2	1. Should be >20 meters from trees 2. Distance from sampler to obstacle, such as buildings, must be at least twice the height the obstacle protrudes above the sampler[b] 3. Must have unrestricted airflow 270° around the sampler 4. No furnace or incineration flues should be nearby[c] 5. Must have minimum spacing from roads; this varies with height of monitor and spatial scale
SO_2	All	3 - 15	>1	>1	1. Should be >20 meters from trees 2. Distance from inlet probe to obstacle, such as buildings, must be at least twice the height the obstacle protrudes above the inlet probe[b] 3. Must have unrestricted airflow 270° around the inlet probe, or 180° if probe is on the side of a building 4. No furnace or incineration flues should be nearby[c]
CO	Micro	3 ± 1/2	>1	>1	1. Must be >10 meters from intersection and should be at a mid-block location 2. Must be 2-10 meters from edge of nearest traffic lane 3. Must have unrestricted airflow 180° around the inlet probe
	Middle, neighborhood	3 - 15	>1	>1	1. Must have unrestricted airflow 270° around the inlet probe, or 180° if probe is on the side of a building 2. Spacing from roads varies with traffic

(continued)

Table 1.4.6.3 (continued)

Pollutant	Scale	Height above ground, meters	Distance from supporting structure, meters		Other spacing criteria
			Vert	Horiz[a]	
O_3	All	3 - 15	>1	>1	1. Should be >20 meters from trees 2. Distance from inlet probe to obstacle, such as buildings, must be at least twice the height the obstacle protrudes above the inlet probe 3. Must have unrestricted airflow 270° around the inlet probe, or 180° if probe is on the side of a building 4. Spacing from roads varies with traffic
NO_2	All	3 - 15	>1	>1	1. Should be >20 meters from trees 2. Distance from inlet probe to obstacle, such as buildings, must be at least twice the height the obstacle protrudes above the inlet probe[b] 3. Must have unrestricted airflow 270° around the inlet probe, or 180° if probe is on the side of a building 4. Spacing from roads varies with traffic

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

[b]Sites not meeting this criterion would be classified as middle scale (see text).[2]

[c]Distance is dependent on height of furnace or incineration flue, type of fuel or waste burned, and quality of fuel (sulfur and ash content). This is to avoid undue influences from minor pollutant sources.

Stationary source emission system design - Factors that should be considered during stationary source emission monitoring system design are discussed in Volume III. The items most important during the pretest preparation are:

1. Familiarization with process design and operation. The success of source emission monitoring requires familiarity with the process to be monitored. The following are areas in which familiarity is particularly important:

a. Process operation principle.

b. Process flow chart.

c. Variability of process operation in terms of flow rate of effluent to be monitored and concentration of pollutant in the effluent.

d. Process data that must be collected during sample collection (e.g., fuel burning rate).

e. Identify the key parameters and their representative levels of operation.

f. Sample collection site considerations, including sample site location (no turbulence due to upstream obstructions or bends), sample port access and size, size of platform for sample collection work, and utilities availability for sample collection equipment.

2. Measurements needed for design of the sample collection program - During the on-site visit, certain measurements are normally made that are required for the design of the sample collection program. These measurements include:

a. Dimensions of the stack or duct cross-section so that a sampling plan by equal cross-sectional areas can be determined.

b. Gas velocity, gas temperature, and gas moisture content so that requirements for isokinetic sampling can be calculated.

The selection of proper sampling sites and preliminary measurements required for monitoring system design during the pretest preparation is fundamental in providing monitoring data that are both high quality and representative.

1.4.6.3 REFERENCES

1. Appendix D - Network Design for State and Local Air Monitoring Stations (SLAMS) and National Air Monitoring Stations (NAMS), Federal Register 40 CFR 58, Number 92, May 10, 1979, p. 27586-27592.

2. Appendix E - Probe Siting Criteria for Ambient Air Quality Monitoring, Federal Register 40 CFR 58, Number 92, May 10, 1979, p. 27592-27597.