2.0.9 PHOTOCHEMICAL ASSESSMENT MONITORING STATIONS (PAMS)

Federal regulations require states to establish photochemical assessment monitoring stations (PAMS) as part of their State Implementation Plan monitoring networks in ozone non-attainment areas classified as serious, severe, or extreme. The PAMS program is intended to supplement ozone monitoring and add detailed sampling for its precursors.

Probe Material and Pollutant Sample Residence Time - For the reactive gases, SO_2, NO_2, and O_3, special probe material must be used. Studies have been conducted to determine the suitability of materials such as polypropylene, polyethylene, polyvinylchloride, tygon, aluminum, brass, stainless steel, copper, pyrex glass and teflon for use as intake sampling lines. Of the above materials, only pyrex glass and teflon have been found to be acceptable for use as intake sampling lines for all the reactive gaseous pollutants. Furthermore, EPA has specified borosilicate glass or FEP teflon as the only acceptable probe materials for delivering test atmospheres in the determination of reference or equivalent methods. Therefore, borosilicate glass, FEP teflon, or their equivalent must be used for existing and new NAMS or SLAMS.

For VOC monitoring at those SLAMS designated as PAMS, FEP teflon is unacceptable as the probe material because of VOC adsorption and desorption reactions on the FEP teflon. Borosilicate glass, stainless steel, or its equivalent are the acceptable probe materials for VOC and carbonyl sampling. Care must be taken to ensure that the sample residence time is 20 seconds or less.

No matter how nonreactive the sampling probe material is initially, after a period of use, reactive particulate matter is deposited on the probe walls. Therefore, the time it takes the gas to transfer from the probe inlet to the sampling device is also critical. Ozone in the presence of NO will show significant losses even in the most inert probe material when the residence time exceeds 20 seconds. Other studies indicate that a 10-second or less residence time is easily achievable. Therefore, sampling probes for reactive gas monitors at SLAMS or NAMS must have a sample residence time less than 20 seconds.

Horizontal and Vertical Probe Placement - The probe inlet must be located 3 to 15 meters above ground level. This range provides a practical compromise for finding suitable sites for the multipoint PAMS. The probe inlet must also be located more than one meter vertically or horizontally away from any supporting structure.

Spacing from Obstructions - The probe must be located away from obstacles and buildings such that the distance between the obstacles and the probe inlet is at least twice the height that the obstacle protrudes above the sampler. The sampler is considered obstructed if an imaginary line extended 30 degrees up from the horizontal and rotates 360 degrees intersects any obstruction within 30 meters. There must be unrestricted airflow in an arc of at least 270 degrees around the probe inlet. Additionally, the predominant wind direction for the period of greatest pollutant concentration must be included in the 270 degree arc. If the probe is located on the side of the building, 180 degrees clearance is required.

Spacing form Roads - It is important in the probe siting process to minimize destructive interferences from sources of nitrogen oxide (NO) since NO readily reacts with O_3. The table below provide the required minimum separation distances between roadways and PAMS (excluding upper air measuring stations):

TABLE 2.0.9.1
MINIMUM SEPARATION DISTANCES
BETWEEN ROADWAYS AND PAMS

Average Daily Traffic (Vehicles/Day)	Minimum Separation Distance* (meters)
<10,000	>10
15,000	20
20,000	30
40,000	50
70,000	100
>110,000	>250

*Interpolation of these distances should be made for intermediate traffic data.

Type (1), (3), and (4) sites are intended to be regionally representative and should not be unduly influenced by nearby roadways. Similarly, a nearby roadway should not act as a local depressor of O_3 concentrations for type (2) and (3) sites.

Spacing from Trees - Trees can provide surfaces for adsorption and/or reactions to occur and can obstruct normal wind flow patterns. To minimize these effects at PAMS, the probe inlet should be placed at least 20 meters from the dripline of the trees. Since the scavenging effect of trees is greater for O_3 than for the other criteria pollutants, strong consideration of this effect must be given in locating the

PAMS probe inlet to avoid this problem. Therefore, the samplers must be at least 10 meters from the dripline of trees that are located between the urban city core area and the sampler along the appropriate wind direction.

Meteorological Measurements - The 10 meter meteorological tower at each PAMS site should be located so that measurements can be obtained that are not immediately influenced by surrounding structures and trees. It is important that the meteorological data reflect the origins of, and the conditions within, the air mass containing the pollutants collected at the probe. Specific guidance on siting of meteorological towers is provided in Section 2.0.8.4.