Ozone Monitoring Issues related to the Revised NAAQS:
Network Design Options Under Consideration

This document summarizes network design options being considered as part of the potential revisions to the ozone monitoring network requirements. The purpose of this memorandum is to provide a basis for consultation with the Clean Air Scientific Advisory Committee (CASAC) Ambient Air Monitoring & Methods (AAMM) Subcommittee on February 10, 2009. The following paragraphs summarize the current ozone surveillance network, existing design requirements, and network options under consideration to improve network coverage.

BACKGROUND

In the ozone NAAQS final rule (see 73 FR 16436) that revised the level of the primary and secondary ozone NAAQS to an 8-hour average of 0.075 ppm, EPA also committed to a separate rulemaking that would support the changes necessary in monitoring network requirements to ensure that the ozone network was adequate in light of the changes. EPA has completed the final draft of this proposed rule and it is currently undergoing review by the Office of Management and Budget (OMB). The following is a summary of the technical issues of the ozone monitoring rule as transmitted to OMB.

CHANGES TO URBAN NETWORK DESIGN REQUIREMENTS

Presently, States (including the District of Columbia, Puerto Rico, and the Virgin Islands) and local air quality management agencies when so delegated by the State are required to operate minimum numbers of EPA-approved ozone monitors based on the population of each of their Metropolitan Statistical Areas (MSA) and the most recently measured ozone levels for each area. These requirements are contained in 40 CFR part 58 Appendix D, SLAMS Minimum Ozone Monitoring Requirements, Table D-2. These requirements were last revised on October 17,

2006, as part of a comprehensive review of ambient monitoring requirements for all criteria pollutants. (See table 1).

Currently, the minimum number of ozone monitors required in an MSA ranges from zero (for an area with a population of at least 50,000 and under 350,000 and no recent history of an ozone design value greater than 85 percent of the level of the NAAQS) to four (for an area with a population greater than 10 million and an ozone design value greater than 85 percent of the level of the NAAQS). Because these requirements apply at the MSA level, large urban areas consisting of multiple MSAs can be required to have more than four monitors.

There are 105 MSAs with populations between 50,000 and less than 350,000 that are presently without any ozone monitors supporting design value calculations for either 2004 to 2006 or 2005 to 2007 (see figure 1). These unmonitored MSAs have a total population of approximately 18 million people and include areas in 37 States and Puerto Rico. The existing regulations do not require these MSAs to begin monitoring for ozone. Comments that were received from State air monitoring agencies and from multi-state air planning organizations in response to the ozone NAAQS proposal expressed concern that these requirements ignore the needs that States and localities have for additional monitors to measure ozone levels in a variety of locations, particularly in areas with populations under 350,000. The commenters stated that unless this deficiency is corrected, the health benefits of EPA's ozone NAAQS revision would likely be limited to those living in MSAs having populations of more than 350,000. Other commenters noted the difficulty in defining the boundaries of new attainment/non-attainment areas without additional monitoring in the MSA's below 350,000 population.

EPA is considering the modification of the minimum ozone monitoring requirements to require one monitor to be placed in MSAs of populations of between 50,000 and less than 350,000 in situations when there is an absence of a design value. States would likely have to install some new monitors and/or have the option to relocate existing monitors under certain conditions.

CHANGES TO NON-URBAN NETWORK DESIGN REQUIREMENTS

The revised secondary standard put into place during the recent NAAQS revision was intended to provide protection to sensitive vegetation in less urbanized areas, in particular those Class I and Wilderness areas set aside by Congress to be protected so as to conserve the scenic value and the natural vegetation and wildlife within such areas, and to leave them unimpaired for the enjoyment of future generations. The secondary ozone NAAQS also considered the benefits that would be provided to the public welfare from increased protection of sensitive vegetation in other Federal, State, Tribal and/or public interest lands that have been set aside for a similar purpose. These areas are characterized by the presence of ozone-sensitive species of native vegetation that have been shown to be subject to ozone-induced visible foliar injury, impaired growth, and/or other adverse impacts to a degree that could be considered adverse.

Currently, existing ozone monitoring requirements and current State monitoring practices are primarily oriented towards protecting against human health effects and therefore towards reporting compliance with the primary NAAQS. This accounts for the current focus of the monitoring requirements on urban areas, where large populations reside, in which significant emissions of ozone-forming precursors are found, and where ozone concentrations of concern have been historically measured. EPA believes that the previously described potential changes to urban monitoring requirements will be adequate for determining compliance with the

secondary NAAQS in MSAs, noting that the assessment of welfare effects has not been a traditional objective of urban-based ozone monitoring networks.

There are no EPA requirements for ozone monitoring in less populated areas outside of MSA boundaries or in rural areas. However, at present there are about 200 State operated ozone monitors in counties that are not part of MSAs. EPA operates a network of about 58 ozone monitors as part of its Clean Air Status and Trends Network (CASTNET). The National Park Service (NPS) operates about 23 monitors at other CASTNET sites. CASTNET ozone monitors are primarily located in rural areas; siting criteria require distances of at least 40 kilometers from cities of greater than 50,000 population as well as other separation requirements from air pollution sources. Taking into account both State and EPA/NPS operated non-urban ozone monitors, an analysis of the distribution of these monitors indicates a relatively high spatial density in the eastern one-third of the U.S. and in California, with significant gaps in coverage elsewhere across the country. Virtually all States east of the Mississippi River have at least several non-urban ozone monitors, while many large mid-western and western States have one or fewer monitors (see figure 2).

EPA believes that the public input received on this issue during the ozone NAAQS process together with internal technical reviews support the consideration of additional non-urban monitoring requirements. These requirements would support the following objectives:

1. Providing better characterization of ozone exposures to ozone-sensitive vegetation and ecosystems in rural/remote areas to ensure that potential secondary NAAQS violations are measured. This objective would also serve the purpose of providing more consistent support for studies examining the impact of elevated ozone levels in wilderness areas, locations with ozone-sensitive natural vegetation, and in areas such as National Parks.

2. Assessment of population exposure due to elevated ambient ozone levels in smaller communities located outside of the larger urban MSAs covered by urban monitoring requirements.

3. Assessment of the location and severity of maximum ozone concentrations that occur in non-urban areas.

Given these objectives, EPA is considering the addition of a requirement that each State operate a minimum of three non-urban ozone monitors in addition to the current and potential urban ozone monitoring requirements described earlier. The first required non-urban monitor could be located in areas such as some Federal, State, or Tribal lands, including wilderness areas that have ozone-sensitive natural vegetation and/or ecosystems; lands with other ownership may also be appropriate. The second required non-urban monitor could be placed in a Micropolitan Statistical Area expected to have ozone design value concentrations of at least 85 percent of the NAAQS. The third required non-urban monitor could be placed in the area of expected maximum ozone concentration outside of any MSA, potentially including the far-downwind transport zones of currently well-monitored urban areas.

CHANGES TO REQUIRED OZONE MONITORING SEASON

EPA has done an analysis to address the issue of whether extensions of currently required monitoring seasons are appropriate in light of the revised NAAQS. The analysis has investigated the occurrence of exceedances of the revised NAAQS (8-hour ozone averages above 0.075 ppm) in unmonitored months using monitors collecting ozone data year-round in 2004-2006. Additionally, the analysis examined occurrences of 8-hour ozone averages of at least 0.060 ppm, the concentration that serves as the revised AQI breakpoint between the Good and Moderate indicator level. A statistical model was used to predict ozone concentrations in areas where no year-round ozone monitors were operated. The model is based on the relationship between maximum 8-hour ozone concentrations and meteorological variables including temperature and relative humidity.

Exceedances of the revised ozone NAAQS during months outside of the required monitoring season occurred in eight States during the 2004-2006 study period (Maine, Massachusetts, New Hampshire, New Jersey, New York, South Carolina, Vermont, Wyoming). Except for Wyoming, these exceedances occurred in a very limited manner, occurring just before the beginning of the required ozone monitoring season which began on April 1 for those States (i.e., on March 30 or March 31). In Wyoming, the frequency of ozone exceedances before the beginning of the required ozone season was higher, with multiple occurrences noted at several sites up to two months prior to the April 1 startup of required ozone monitoring.

As would be expected, the frequency of occurrences of the revised Moderate AQI level during months outside of the required monitoring season revealed many examples of such readings. A total of 32 States experienced such occurrences; 22 States with Moderate level AQI readings only before the required season, 9 States with such levels noted before and after the required season, and 1 State with such levels only after the season. In a number of cases, the frequency of such Moderate AQI levels was quite high, with some States experiencing over a dozen days during 2004 to 2006 at a high percentage of their operating year-round ozone monitors.

The specific changes to the required State ozone monitoring seasons that are under consideration are as follows: Minnesota, an increase of one month (19 states), two months (6 states), four months (3 states), and five months (Wyoming). Ozone season requirements are currently split by Air Quality Control Region in Louisiana and Texas. Included in the above State-by-State accounting is the proposal to lengthen the required season in the northern part of Louisiana by one month (southern Louisiana ozone monitors would remain on a required year-

round schedule) and the proposal for the required season in Texas to become year-round for the entire State.

NCore stations are required to operate a full suite of gaseous and particulate matter monitors as well as basic meteorology to support these objectives. Given the potential value of NCore data to support year-round scientific studies, EPA believes that it is appropriate to require that ozone monitors at NCore stations be operated on a year-round basis. Accordingly, EPA is considering a change to the required monitoring season for NCore stations to a year-round schedule regardless of the length of the required ozone monitoring season for the remainder of the SLAMS monitors within a State.

Table 2 includes the current ozone monitoring season requirements and the changes under consideration.

Table 1

SLAMS Minimum O_3 Monitoring Requirements.

MSA population[1,2]	Most recent 3-year design value concentrations ≥85% of any O_3 NAAQS[3]	Most recent 3-year design value concentrations <85% of any O_3 NAAQS[3,4]
>10 million	4	2
4 - 10 million	3	1
350,000 - <4 million	2	1
50,000 - <350,000[5]	1	0

[1] Minimum monitoring requirements apply to the Metropolitan statistical area (MSA).
[2] Population based on latest available census figures.
[3] The ozone (O_3) National Ambient Air Quality Standards (NAAQS) levels and forms are defined in 40 CFR part 50.
[4] These minimum monitoring requirements apply in the absence of a design value.
[5] Metropolitan statistical areas (MSA) must contain an urbanized area of 50,000 or more population.

Figure 1

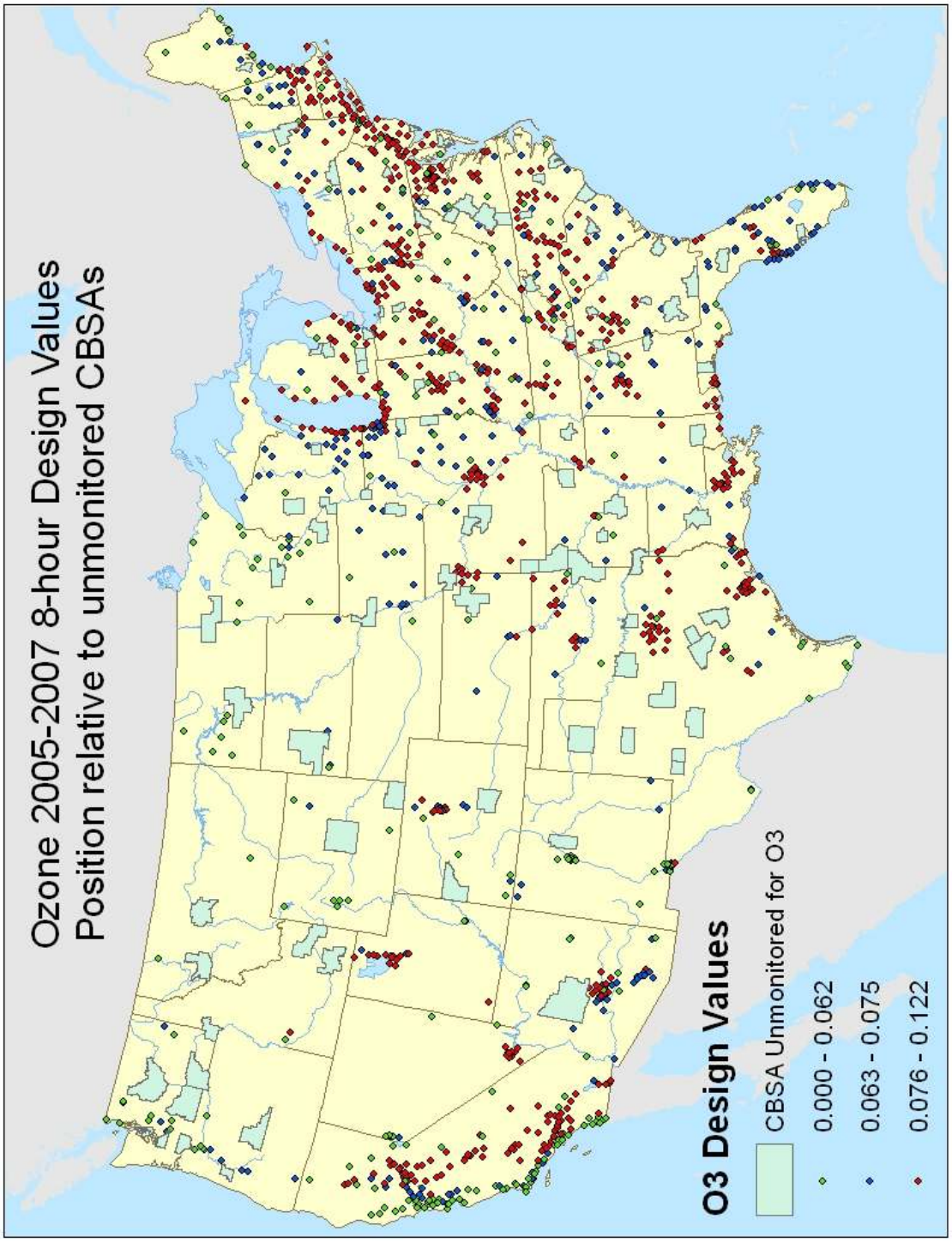
Ozone 2005-2007 8-hour Design Values
Position relative to unmonitored CBSAs
O3 Design Values
CBSA Unmonitored for O3
0.000 - 0.062
0.063 - 0.075
0.076 - 0.122

Figure 2

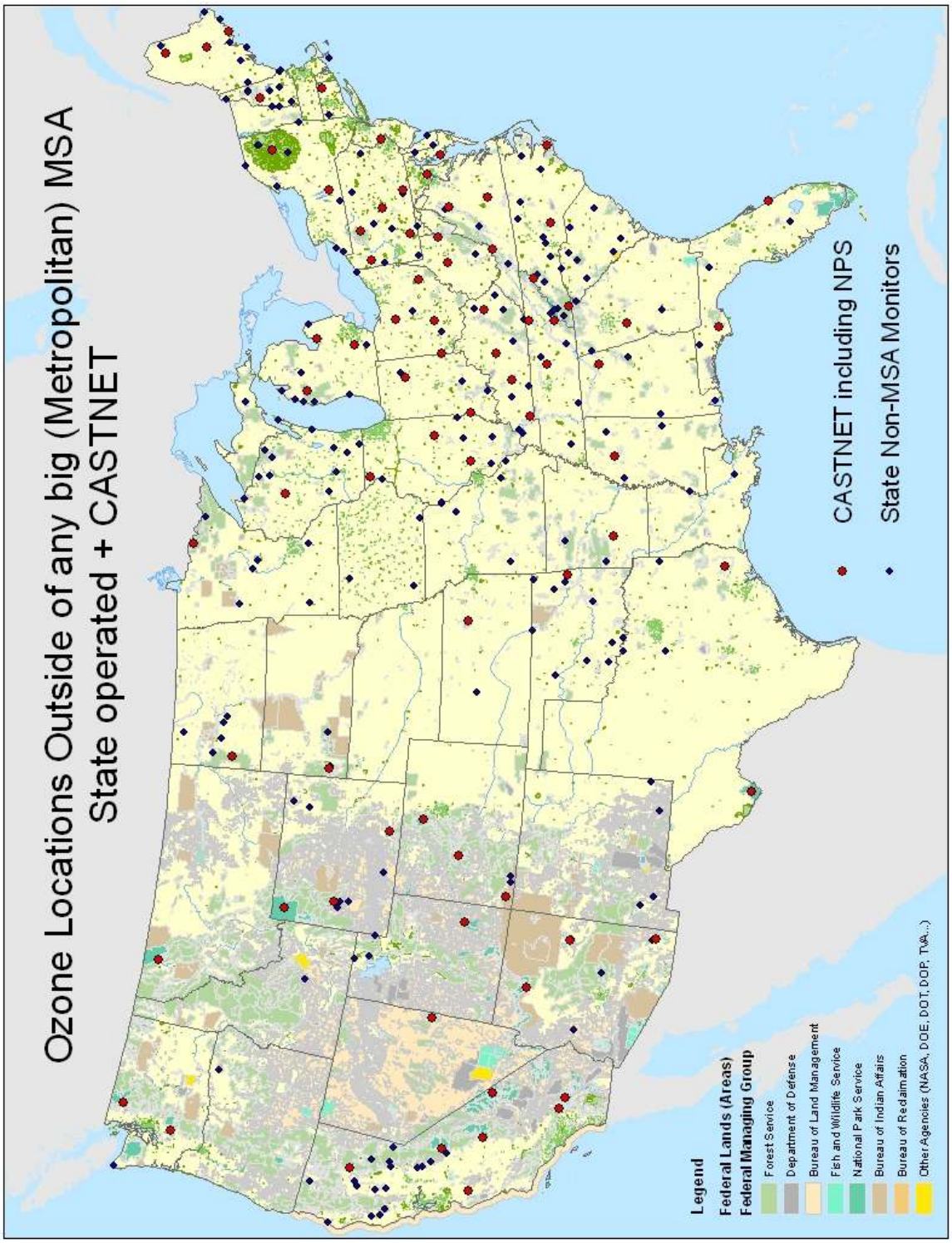
Ozone Locations Outside of any big (Metropolitan) MSA
State operated + CASTNET
CASTNET including NPS
State Non-MSA Monitors
Legend
Federal Lands (Areas)
Federal Managing Group
Forest Service
Department of Defense
Bureau of Land Management
Fish and Wildlife Service
National Park Service
Bureau of Indian Affairs
Bureau of Reclamation
Other Agencies (NASA, DOE, DOT, DOP, TVA...)

Table 2 - Ozone Monitoring Season - Summary Of Changes Under Consideration					
State	Current Begin	Proposed Begin	Current End	Proposed End	Net Change (months)
Alabama	March	March	October	October	0
Alaska	April	April	October	October	0
Arizona	January	January	December	December	0
Arkansas	March	March	November	November	0
California	January	January	December	December	0
Colorado	March	March	September	September	0
Connecticut	April	March	September	October	2
Delaware	April	March	October	October	1
DC	April	March	October	October	1
Florida	March	January	October	December	4
Georgia	March	February	October	October	1
Hawaii	January	January	December	December	0
Idaho	May	April	September	September	1
Illinois	April	April	October	October	0
Indiana	April	March	September	October	2
Iowa	April	April	October	October	0
Kansas	April	April	October	October	0
Kentucky	March	March	October	October	0
Louisiana **	January	January	December	December	0
Louisiana **	March	March	October	November	1
Maine	April	April	September	September	0
Maryland	April	March	October	October	1
Massachusetts	April	March	September	September	1
Michigan	April	April	September	September	0
Minnesota	April	April	October	September	-1
Mississippi	March	January	October	December	4
Missouri	April	March	October	October	1
Montana	June	May	September	September	1
Nebraska	April	April	October	October	0
Nevada	January	January	December	December	0
New Hampshire	April	March	September	September	1
New Jersey	April	March	October	October	1
New Mexico	January	January	December	December	0
New York	April	March	October	October	1
North Carolina	April	March	October	October	1
North Dakota	May	April	September	September	1
Ohio	April	April	October	October	0
Oklahoma	March	March	November	November	0
Oregon	May	May	September	September	0
Pennsylvania	April	March	October	October	1
Rhode Island	April	April	September	September	0
South Carolina	April	February	October	October	2
South Dakota	June	April	September	September	2
Tennessee	March	February	October	October	1
Texas **	January	January	December	December	0
Texas **	March	January	October	December	4
Utah	May	April	September	October	2
Vermont	April	March	September	September	1
Virginia	April	March	October	October	1
Washington	May	March	September	September	2
West Virginia	April	April	October	October	0
Wisconsin	15-Apr	April	15-Oct	October	1
Wyoming	April	January	October	December	5
American Samoa	January	January	December	December	0
Guam	January	January	December	December	0
Puerto Rico	January	January	December	December	0
Virgin Islands	January	January	December	December	0

** Season depends on Air Quality Control Region (AQCR)