# Projected PM2.5 Attainment Status of Each County in the U.S. Based on 1999-2000 Monitoring Results and Projected Impact On Existing And Proposed New Electric Power Generation Facilities

Dr. Howard M. Ellis, QEP
Enviroplan Consulting, 81 Two Bridges Road, Fairfield, NJ 07004
E-mail: hellis@enviroplan.com ; Telephone: (973) 575-2555 ext. 3211; Fax: (973) 575-6617

Nishat Hydari
Enviroplan Consulting, 81 Two Bridges Road, Fairfield, NJ 07004
E-mail: nhydari@enviroplan.com ; Telephone: (973) 575-2555 ext. 3216; Fax: (973) 575-6617

Adeel Yousuf
Enviroplan Consulting, 81 Two Bridges Road, Fairfield, NJ 07004
E-mail: ayousuf@enviroplan.com ; Telephone: (973) 575-2555 ext. 3252; Fax: (973) 575-6617

Alic Bent
Enviroplan Consulting, 81 Two Bridges Road, Fairfield, NJ 07004
E-mail: abent@enviroplan.com ; Telephone: (973) 575-2555 ext. 32xx; Fax: (973) 575-6617

**Summary**

Air quality monitoring data collected since 1999 for fine particulate matter (PM2.5) at over 1,000 sites in the U.S. is indicating the likelihood of widespread designations of nonattainment of the annual PM2.5 National Ambient Air Quality Standard (NAAQS) of 15.0 ug/m3. The purpose of this paper is to project the PM2.5 attainment status of each county in the U.S. based on 1999-2000 monitoring results and discuss the impact of these designations on existing and proposed new electric power generation facilities.

States must propose nonattainment designations for PM2.5 within one year following the collection of three years of monitoring data. U.S. EPA must finalize these nonattainment designations within one year of proposal but no later than December 31, 2005.

Some states may not have sufficient valid monitoring data collected in 1999 to make it the first year of the three-year period. All states must use monitoring data for their nonattainment designations that begins no later than 2000.

We reviewed the first two years of PM2.5 monitoring data collected in each county in each of the 50 states plus the District of Columbia. Data for 1999 and 2000 is available in the U.S. EPA's Aerometric Retrieval System (AIRS) database. The monitor with the highest 1999-2000 annual average concentration in each county was identified.

Results of this analysis are that 28 states plus the District of Columbia have 1999-2000 annual average PM2.5 concentrations exceeding 15.0 ug/m3 in one or more counties. Final monitoring

results for 2001 are not yet in the AIRS database. However, it is very likely if the 1999-2000 annual average exceeds 15.0 ug/m3 that the 1999-2001 annual average will also exceed 15.0 ug/m3.

Next, we determined the average percent reduction in PM2.5 concentration needed to attain the annual NAAQS for the counties in each state where the highest monitor exceeded 15.0 ug/m3. This percent reduction ranges from 1.4% to 43.1%. For 24 of the 28 states, this reduction is 21.4% or less. Only California, Oklahoma, Michigan and Georgia require larger reductions and only California and Georgia have more than one county requiring such larger reductions.

In addition to the annual NAAQS for PM2.5, there is a 24-hour standard of 65 ug/m3 measured by the 98th percentile of the 24-hour concentrations each year averaged over three years. A qualitative review of this data indicates that the annual standard should be controlling in terms of emission reduction requirements and that the 24-hour standard will be attained in all or almost all counties in each state.

What is the expected impact of these projected nonattainment designations on existing electric power generation capacity?

U.S. EPA's current preliminary draft strategy for development of State Implementation Plans (SIPs) for demonstrating attainment of the PM2.5 annual standard is a "secondary first" approach, i.e. conduct regional air quality modeling at the PM2.5 monitors not attaining the standard to determine whether regional reductions in emissions that are precursors to PM2.5 formation will reduce concentrations sufficiently to attain the annual standard. Such control strategies to attain the PM2.5 annual NAAQS may focus on further reductions in SO2 and NOx emissions from electric power plants in certain regions determined from regional scale modeling.

However, recently published research on fine particles and oxidant pollution by U.S. EPA and private researchers indicates that the limited data available to date indicates that the contribution of secondary particulate matter to PM2.5 concentrations varies geographically from under 20% to more than 50%.

Secondary PM2.5 contributions to the annual average PM2.5 are decreasing as the Phase II acid rain SO2 emission reductions and Clean Air Act Section 407 NOx emission reductions from utility units take effect thereby reducing the PM2.5 sulfate and nitrate contributions. These secondary contributions to PM2.5 concentrations will continue to decrease as states implement the NOx reduction requirements in the NOx SIP Call regulation Under court order, all NOx reductions under the SIP Call must take place by May 31, 2004.

As a result, primary PM2.5 emissions may be responsible for a significant portion of the total PM2.5 concentration at many of the PM2.5 monitors exceeding 15.0 ug/m3 annual average concentration for 1999-2000 and in the future.

Since 24 of the 28 states plus the District of Columbia with 1999-2000 annual average PM2.5 concentrations exceeding 15.0 ug/m3 only do so by an average of 21% or less, there is significant potential for a "primary first" control strategy to attain the PM2.5 annual air quality standard in many if not most of these states. With a "primary first" strategy, the major primary sources contributing to each PM2.5 monitor not attaining the air quality standard would be identified and emission reductions would first be applied to these sources. Secondary emission reductions would be applied to any remaining violations of the NAAQS to demonstrate attainment.

What is the expected impact of these projected nonattainment designations on planned new electric power generation capacity?

For new power generation capacity locating in or near PM2.5 nonattainment areas, current law requires SIP revisions for attainment of the NAAQS for PM2.5 to be promulgated between December 2007 and December 2009.

These SIP revisions will almost certainly include provisions to comply with the Emission Offset Interpretive Ruling under 40 CFR Part 51 Appendix S requiring major new sources and major modifications to existing sources to obtain emission reductions (offsets) from existing sources that exceed the emissions from the new source.

It will be difficult and very costly to create these emission offsets through PM2.5 emission reductions since the cost of particulate control increases exponentially as particle diameter decreases.

Less costly SO2, NOx and volatile hydrocarbon emission reductions are being considered for use in California as emission offsets for new sources locating in PM10 nonattainment areas because of the secondary formation of PM10 from these precursors. It is possible that these precursor pollutants will be considered by U.S. EPA and state agencies for PM2.5 emission offsets when such offsets are needed later in this decade.

Overall, permitting of new power generation capacity with significant PM2.5 emissions such as new or modified coal-fired power plants will become even more difficult later in the decade as these new PM2.5 requirements come into effect.