May 7, 2014

MEMORANDUM

SUBJECT: Request for Additional Technical Information on the Relationship between 1-Year Average and 3-Year Average W126 Levels

FROM: Erika Sasser, Acting Director /s/
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TO: Holly Stallworth
Designated Federal Officer
Clean Air Scientific Advisory Committee
EPA Science Advisory Board Staff Office

On April 22, 2014, members of the Clean Air Scientific Advisory Committee's Ozone Review Panel requested additional technical information about the relationship between 1-year average and 3-year average W126 levels. In response, on April 22, 2014, EPA transmitted a draft version of a technical analysis conducted in 2010 by EPA staff that made a comparison based on data from 2007 through 2009, the most recent data available at that time.

This technical memorandum titled "Relationship between W126 annual values and 3-year averages", although formatted as a "Reconsideration of the 2008 Ozone NAAQS Docket (EPA-HQ-OAR-2005-0172), Memo to Docket," was never finalized and not docketed at that time. More importantly, this deliberative memorandum has been superseded by a more recent analysis using more recent ambient air quality data described in Appendix 2C, titled "Inter-Annual Variability in W126 Index Values: Comparing Annual and 3-Year Average Metrics (2008-2010)," of the January 2014 *Policy Assessment for the Review of the Ozone National Ambient Air Quality Standards, Second External Review Draft* (EPA-452/P-14-002) (http://www.epa.gov/ttn/naaqs/standards/ozone/s_o3_2008_pa.html). As particularly important in this context, we highlight one of the conclusions from this more recent evaluation below:

> "Finally, the data analysis presented in this appendix shows that the inter-annual variability in the annual W126 index tends to decrease with decreasing W126 levels. Thus, it is expected that reductions in NO_x emissions will not only result in lower 3-year average W126 levels, but also result in less inter-annual variability associated with annual W126 levels."

This recent analysis suggests that the relationship between 3-year average W126 levels and annual W126 levels is dynamic and will continue to change in the future with changing pollution levels. The technical memorandum can be found in Docket ID No. EPA-HQ-OAR-2008-0699 and Appendix 2C is attached.

We appreciate the advice of the Panel, and look forward to your comments during the upcoming Panel teleconference. Should you have any questions regarding this memorandum, please contact me (919-541-3889; email sasser.erika@epa.gov), Bryan Hubbell (919-541-0621; email hubbell.bryan@epa.gov), or Karen Wesson (919-541-3515; email wesson.karen@epa.gov).

ATTACHMENT 1: APPENDIX 2C

INTER-ANNUAL VARIABILITY IN W126 INDEX VALUES: COMPARING ANNUAL AND 3-YEAR AVERAGE METRICS (2008-2010)

2C.1 OVERVIEW

This appendix describes an analysis comparing values for a single-year or annual W126 metric to a W126 metric averaged over three consecutive years. The purpose of this analysis is to compare values based on a 3-year average of annual W126 indices to values based on a single annual W126 index. The deviations of the annual W126 index values in 2008, 2009, and 2010 from the 2008-2010 average W126 index values are presented.

2C.2 GENERAL DATA PROCESSING

The air quality data for this analysis originated from EPA's Air Quality System (AQS) data base, the official repository of ambient air measurements. The data used in this analysis consisted of W126 index values calculated from hourly ozone concentrations measured at 1082 ozone monitors nationwide. Ozone monitors must have submitted data to AQS for at least 75% days in their required ozone monitoring season in 2008, 2009, and 2010 to be included in the analysis.

2C.3 RESULTS & CONCLUSION

The figure below shows a scatter plot of the deviations in the annual W126 index from the 3-year average by monitor. The solid curves represent the average deviation in a moving window along the x-axis for each year. From this figure, it is apparent that the highest annual W126 index value occurred in 2008 for most monitoring locations, the lowest annual W126 index value occurred in 2009 for most monitoring locations, and the 2010 W126 index value was generally somewhere in between. It is also apparent that the inter-annual variability in the W126 index increases along with the 3-year average. For monitors with 3-year average W126 values near 15 ppm-hrs, the average deviation was +3.5 ppm-hrs in 2008 and -3.8 ppm-hrs in 2009. This represents a 1-year swing of -7.3 ppm-hrs.

The model-based air quality adjustments in the 2nd draft of the O_3 Welfare REA show that reducing NOx emissions is effective for reducing 3-year average W126 levels. In Appendix 2B, the analyses based on ambient monitoring data also show that large-scale reductions in NOx emissions are associated with lower W126 levels. Finally, the data analysis presented in this appendix shows that the inter-annual variability in the annual W126 index tends to decrease with decreasing W126 levels. Thus, it is expected that reductions in NOx emissions will not only

result in lower 3-year average W126 levels, but also result in less inter-annual variability associated with annual W126 levels.

The W126 index is based on a logistic weighting function that increases the weights assigned to hourly ozone concentrations very rapidly. Hourly ozone concentrations of 50 parts per billion are given a weight of about 10% while concentrations of 80 parts per billion are given a weight of nearly 90%. The annual W126 index is calculated as a 3-month sum of weighted ozone concentrations during daylight hours, which amounts to a sum of roughly 1100 weighted hourly concentrations. Thus, even a modest change in the average daily ozone level may have a significant impact upon the annual W126 index. Since ozone formation is heavily influenced by meteorology, the inter-annual variability in meteorological conditions tends to cause a large inter-annual variability in the W126 index.

In conclusion, this evaluation indicates the extent to which a form for the secondary ozone standard that averages the annual W126 index values over three consecutive years might be expected to account for the annual variability in this index since the 3-year period would be expected to include year(s) below as well as above the 3-year average.

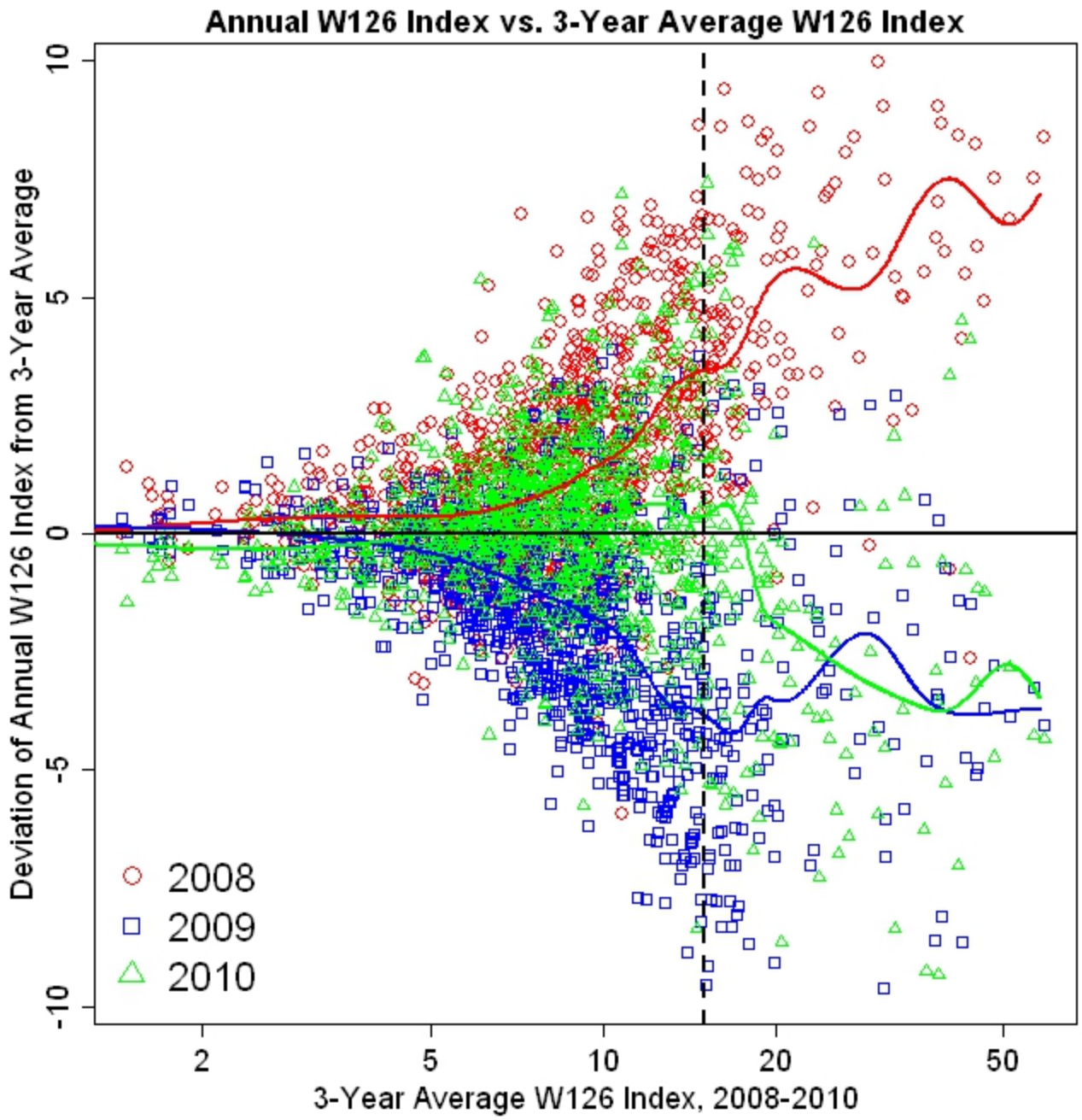

Figure 2C-1. Deviation of the annual W126 index values in 2008, 2009, and 2010 (y-axis) from the 3-year average W126 index value (x-axis).