Key Issues for the January 2014 Draft of the Policy Assessment Document for Ozone
– Advance Written Materials for CASAC Meeting –

Prepared on behalf of UARG
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A Policy Assessment Document (PAD) is where EPA staff summarize policy-relevant information from the Integrated Science Assessment (ISA), Health Risk and Exposure Assessment (HREA) and other analyses to discuss the rationale for choosing one alternative NAAQS over others under consideration. This draft of the PAD for ozone discusses alternative standards of 70, 65 and 60 ppb, with comparisons to the current standard of 75 ppb.[1] Note that the averaging period for the NAAQS is the maximum daily 8-hour average ozone concentration, also called "MDA8."

The PAD should be enhanced to include information on important new results that presently appear to be reported only in Appendix 4 of the draft HREA. New information that is reported in Chapter 2 of the draft PAD should be expanded. The comments below highlight the new information of interest and provide an example of how additional policy-relevant insights can be derived when they are integrated together.

Policy-Relevant Information Presently Only Reported in an Appendix of the HREA Should Be Highlighted in the PAD

EPA has used for the first time the "HDDM approach" to simulate hourly ozone distributions that would just-attain each of the alternative NAAQS standards. Appendix 4 of the HREA reports the percentage reductions in U.S. emissions (nationwide) that EPA has estimated would be needed to attain the current NAAQS and each of the alternative NAAQS. Table 1 copies those results tables into this document. The text of HREA Appendix 4 indicates that these percentage reductions are applied on a uniform national basis. Briefly, the table shows that achieving the current standard of 75 ppb will require between 40% and 87% NOx emissions reductions nationwide from 2007 emissions, except for Chicago which would require only 19% reduction. Achieving tighter alternative standards requires progressively larger percentage reductions; attaining the 60 ppb NAAQS would require nationwide NOx emissions reductions of between 69% and more than 93% from 2007 emissions. (Further, the HDDM analysis was not able to identify a reliable percentage reduction for attainment of 60 ppb in New York City. It finds that 92% emissions reduction nationwide would be required to attain 65 ppb there.)

[1] The draft PAD concludes that a revised ozone NAAQS should not change any of the other attributes of the current standard (*i.e.*, indicator, averaging period, and statistical form), and the comparisons among alternative standards are entirely in terms of alternative levels.

Table 1. Percent Emissions Reductions (Nationwide) to Attain Each NAAQS Level[2]
(Source: Copy of Table 2 from pp. 27-8 of Appendix 4 of the February 2014 draft REA)

Urban Area	Years	Standard Level*			
		75 ppb	70 ppb	65 ppb	60 ppb
Atlanta	2006-2008	50%	58%	64%	71%
	2008-2010	23%	43%	54%	62%
Baltimore	2006-2008	46%	54%	61%	69%
	2008-2010	44%	52%	60%	67%
Boston	2006-2008	40%	49%	61%	70%
	2008-2010	13%	40%	53%	65%
Chicago	2006-2008	19%	52%	66%	80%
	2008-2010	N/A	27%	55%	70%
Cleveland	2006-2008	48%	61%	73%	88%
	2008-2010	50%	64%	77%	88%
Dallas	2006-2008	50%	57%	65%	72%
	2008-2010	50%	58%	64%	71%
Denver	2006-2008	51%	65%	78%	87%
	2008-2010	15%	46%	64%	87%
Detroit	2006-2008	59%	69%	76%	84%
	2008-2010	N/A	54%	66%	78%
Houston	2006-2008	62%	68%	74%	82%
	2008-2010	42%	53%	63%	75%
Los Angeles	2006-2008	87.1%	89.3%	91.2%	93.2%
	2008-2010	87%	89%	91%	93%
New York	2006-2008	64%	74%	92%	N/A
	2008-2010	52%	67%	89%	N/A
Philadelphia	2006-2008	54%	61%	68%	74%
	2008-2010	42%	52%	61%	68%
Sacramento	2006-2008	63%	70%	76%	84%[5]
	2008-2010	64%	71%	77%	84%
Saint Louis	2006-2008	45%	56%	66%	75%
	2008-2010	10%	34%	50%	63%
Washington D.C.	2006-2008	53%	60%	67%	74%
	2008-2010	31%	50%	60%	71%

* N/A values for the 75 ppb standard level mean that a particular urban area did not have any design values above 75 for that 3-year period so no controls were needed. N/A values for the 60 ppb standard level mean that this adjustment methodology was not able to bring design values down to 60 for that particular city and 3-year period.

[2] If emissions controls are to be limited to areas more localized to each nonattaining city, the percentage reductions within those closer areas will have to be even larger than the percentages shown here.

New Policy-Relevant Information in Draft PAD Chapter 2 about the Maximum Feasible Ozone Reduction Should Be Expanded

Chapter 2 of the PAD reports on new model runs by EPA in which all U.S. emissions are eliminated, known as a "zero-out" run. These zero-out results indicate the minimum ozone concentrations that can be expected under any NAAQS level that would be implemented through domestic action only. This is also called "U.S. background" or "USB". Table 2-4 of the PAD (at p. 2-22) reports the USB results for the seasonal average of MDA8 in each of the twelve cities in the HREA, along with the respective "as-is" MDA8 projected by the same model for each city.[3] A copy of that table is provided as Table 2 below. Briefly, it shows that the seasonal average MDA8 exposure metric will remain at somewhere between half and three-quarters of its 2007 levels even if all U.S. manmade NOx emissions were to be eliminated.[4]

Table 2. Summary of New Modeling Results Regarding U.S. Background Ozone
(Source: PAD, p. 2-22.)

Table 2-4. Seasonal mean MDA8 O_3 (ppb), seasonal mean USB contribution (ppb), and fractional USB contribution to total O_3 (all site-days) in the 12 REA urban case study areas (%).

All days, CMAQ	ATL	BAL	BOS	CLE	DEN	DET	HOU	LA	NYC	PHI	SAC	STL
Model MDA8 seasonal mean	58.6	55.6	45.2	51.8	57.1	43.5	49.4	54.8	47.7	50.5	51.9	52.6
Model MDA8 seasonal mean from USB emissions	30.0	29.9	28.5	31.6	42.2	31.7	33.0	33.3	29.1	29.4	34.4	32.0
Fractional contribution from background	0.51	0.54	0.63	0.61	0.74	0.73	0.67	0.61	0.61	0.58	0.66	0.61

This table gives the reader an indication of the very limited degree to which any tightening of the NAAQS will be able to reduce estimated current risk: the maximum reduction of seasonal average MDA8 ozone (which determines short-term mortality risk estimates) would be between 27% and 49% from as-is levels, depending on the city. And reductions of as-is risk levels will be even less except if a NAAQS is set that requires all manmade emissions to be eliminated.

Seasonal average MDA8 is only one of the ozone exposure metrics used in the HREA. The PAD should provide tables such as Table 2 above showing the minimum (USB) level projected for each of the ozone exposure metrics used in the HREA calculations.

[3] Seasonal average MDA8 is not relevant to attainment determination, but it *is* relevant to the HREA's risk estimates, because it is an "exposure metric" that is input to health risk calculations. Specifically, seasonal average MDA8 determines EPA's core estimates of short-term exposure mortality. Other exposure metrics are also used in the HREA calculations, but not discussed in this short set of comments on the PAD.

[4] These estimates are from modeling of 2007 conditions and emissions. While the as-is results are affected by the year modeled, the USB results will be relatively invariant to the emissions year unless the model's weather-related assumptions are also revised.

Insights about the Lack of Responsiveness of Ozone Exposure Metrics to Emissions Reductions

Further insight about the lack of responsiveness of policy-relevant ozone exposure metrics can be obtained by combining the above two sets of information together, as I have done in Figure 1 below.

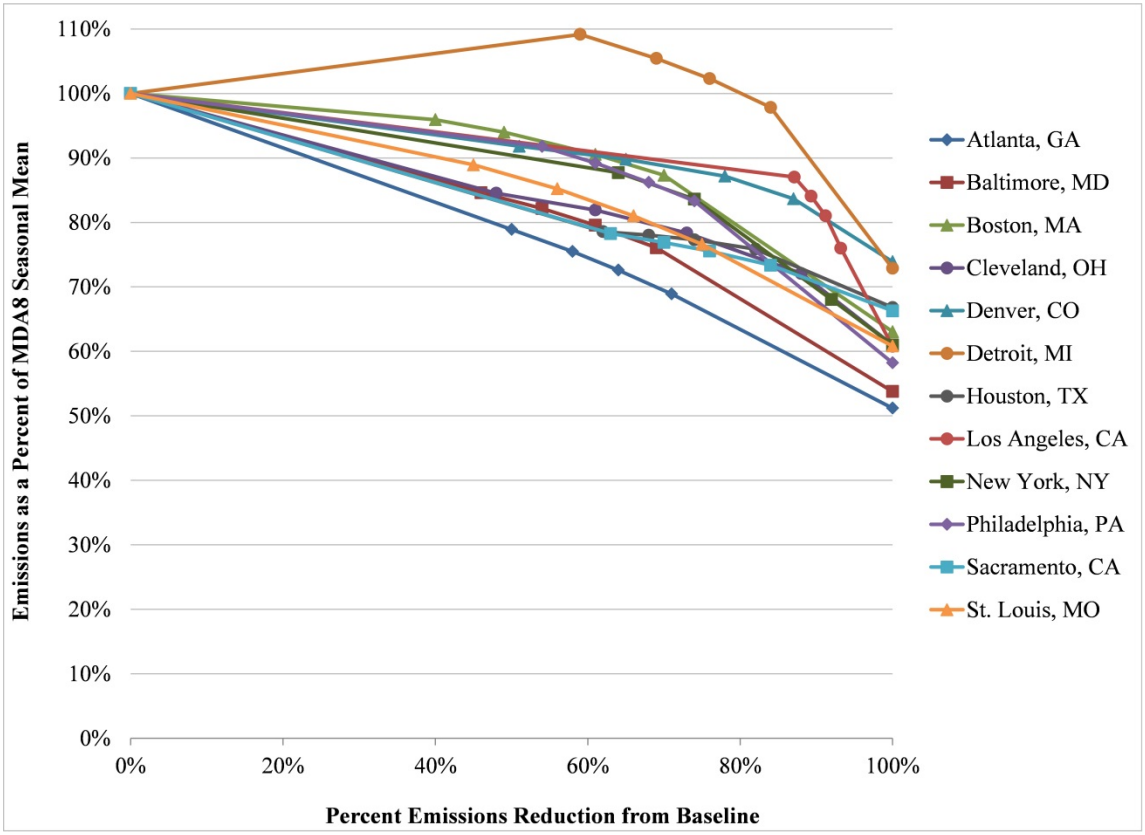
For each of the twelve HREA cities, Figure 1 graphs EPA's projected seasonal average MDA8 levels (stated as a fraction of each city's respective modeled as-is levels) against percentage reduction in nationwide NOx emissions. That is, at 0% emissions reduction (on the x-axis), MDA8 would be the "as-is" level, and hence the values for all twelve cities start at 100% on the y-axis. At 100% nationwide NOx emissions reduction, seasonal average MDA8 would be at each city's respective USB level (i.e., from 27% to 49%, as discussed in the previous section). Each of the points that make up the lines between these two extreme values (moving from left to right on each city's line) reflect the HDDM-based estimates of percentage nationwide emissions reductions required to attain 75, 60, 65 and 60 ppb, respectively, and the associated seasonal average MDA8 in that city. The emissions reductions are taken from Table 1 above, while their y-axis values are computed from HREA air concentration data provided to NERA by EPA.[5]

From the integrated summary of PAD and HREA data in Figure 1, one can observe how well this ozone exposure metric (which in turn determines the estimates of short-term mortality risk reductions in the HREA) responds to each incremental percentage reduction in manmade U.S. NOx emissions. If ozone exposures were to fall in proportion with emissions reductions (i.e., were "responsive" to emissions reductions efforts), then each city's line in Figure 1 would be a straight line between that city's starting point on the x-axis and its USB level on the rightmost end of the line.

Figure 1 does not show that kind of responsiveness, however. Instead, we see that each city's exposure responsiveness curve falls well above such a straight line. The cities with the flattest lines have very little response in overall ozone exposure levels for very large amounts of emissions reductions. In fact, it shows that further emissions reductions in Detroit may actually cause ozone exposure metrics to get worse until about a 60% reduction of national emissions has been achieved.

[5] The seasonal average MDA8 levels are the city-specific composite ozone concentrations used by EPA to estimate core short-term mortality risks at each alternative standard that are reported in the HREA. EPA provided the latter air quality data files at NERA's request. (The seasonal average MDA8 levels in each city are not simply the level of each respective standard because these are composite-monitor seasonal average MDA8 for 2007, while the standard must be attained based on the 98th percentile of MDA8 at the city's worst case monitor, averaged over three years.)

Figure 1. Ozone Exposure Responsiveness for Seasonal Average MDA8
(Source: new data in PAD and HREA drafts)



The unresponsiveness of exposure-relevant ozone metric is highly policy-relevant. The emissions reductions that are used in Figure 1 are assumed to be occurring uniformly from all source categories in the U.S. A majority of those emissions come from transportation, other area sources, households, and small point sources – all of which are known to be difficult to regulate. This difficulty of regulating, combined with this lack of responsiveness, highlights a need to carefully consider the policy significance of the various types of risks that are being analysed in the HREA. For these reasons, a consideration of responsiveness, illustrated by charts such as Figure 1 (prepared for the array of risk-relevant exposure metrics), should be provided in the next draft of the PAD.