

## Appendix 8a: Sensitivity Analysis for Alternative Standard of 65 ppb

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### Synopsis

This appendix presents the sensitivity analysis for an alternative standard of 65 ppb. Because the proposal requests comments on alternative NAAQS levels from 65 ppb to 125 ppb, we included an analysis of the costs of benefits of attaining 65 ppb as a sensitivity.

### 8a.1 Identified Control Strategy Analysis

As shown in Table 8a.1, only one county is projected to exceed an alternative standard of 65 ppb using the air quality estimation technique presented in Chapter 3. Adams County, CO exceeds the alternative standard by 1 ppb, and is projected to need to control approximately 460 tons of emissions to attain 65 ppb.

**Table 8a.1: Projected Ambient Concentration of NO<sub>2</sub> in 2020 and Emission Reductions Needed for Attainment of an Alternative Standard of 65 ppb<sup>a</sup>**

State	County	Ambient Concentration in 2020 (ppb)	NOx Emission Reductions Needed in 2020 (tons/year)
CO	Adams	66.4	460

<sup>a</sup> All estimates rounded to two significant figures.

As discussed in Chapter 4, the controls analyzed for Adams County consisted of point source controls for a local EGU facility. To illustrate attainment with an alternative standard of 65 ppb, only one control was applied to the facility. This one control yielded emission reductions of 1,400 tons (Table 8a.2). This is greater than the emission reductions needed for this county, but after looking at the other available control options for this geographic area, it appeared this was still the most cost-effective option. Table 8a.3 shows the ambient concentration of NO<sub>2</sub> post the application of identified controls.

**Table 8a.2: Emission Reductions by County in 2020 for Alternative Standard 65 ppb<sup>a</sup>**

State	County	NOx Emission Reductions in 2020 (tons/year)
CO	Adams	1,400

<sup>a</sup> All estimates rounded to two significant figures.

**Table 8a.3: Projected Ambient NO<sub>2</sub> Concentration in 2020 Achieved with Identified Controls for the Alternative Standard of 65 ppb**

State	County	2020 NO <sub>2</sub> Concentration (ppb)
CO	Adams	63.4

### 8a.2 Cost Analysis

The identified control costs for Adams County are presented in Table 8a.4. The total engineering costs of an alternative standard of 65 ppb is three million dollars using a seven percent discount rate.

**Table 8a.4: Annual Control Costs of Identified Controls applied for the Alternative Standard Analysis of 65 ppb (Millions of 2006\$) <sup>a, b</sup>**

State	County	3% Discount Rate <sup>c</sup>	7% Discount Rate
CO	Adams	\$2.3	\$3.0
	Total	<b>\$2.3</b>	<b>\$3.0</b>

<sup>a</sup> All estimates rounded to two significant figures. As such, totals will not sum down columns.

<sup>b</sup> All estimates provided reflect the engineering cost of the modeled control strategy, incremental to a 2020 baseline of compliance with the current PM<sub>2.5</sub> and Ozone standards.

### 8a.3 Benefits Analysis

In order to calculate the benefits of attaining an alternative standard level of 65 ppb, we used the same benefits methodology as described in Chapter 5 with one minor adjustment. To calculate the NO<sub>2</sub> benefits of attaining 65 ppb, we interpolated from the benefits estimates for 50 ppb. The interpolation factor is the ratio between the concentration reduction each non-attaining area needed to get to 65 ppb and the concentration reduction each non-attaining area needed to get to 50 ppb. We believe this is a reasonable approximation because of the magnitude of NO<sub>2</sub> benefits relative to PM<sub>2.5</sub> co-benefits and the minimal non-attainment problem at these levels. These estimates reflect EPA's most current interpretation of the scientific literature on PM<sub>2.5</sub> and mortality, including our updated benefits methodology (i.e., a no-threshold model that calculates incremental benefits down to the lowest modeled PM<sub>2.5</sub> air quality levels and incorporates two technical updates) compared to the estimates in previous RIAs that did not include these changes.

**Table 8a.5: Total NO<sub>2</sub> and PM<sub>2.5</sub> Benefits to attain 65 ppm at discount rates of 3% and 7% (millions of 2006\$)\***

	3% Full Attainment	7% Full Attainment
<b>NO<sub>2</sub></b>	\$0.67	\$0.67
<b>PM<sub>2.5</sub></b>		
<b>Pope et al</b>	\$11	\$9.7
<b>Laden et al</b>	\$26	\$24
<b>TOTAL with Pope</b>	<b>\$11</b>	<b>\$10</b>
<b>TOTAL with Laden</b>	<b>\$27</b>	<b>\$24</b>

\*Numbers have been rounded to two significant figures and therefore summation may not match table estimates. All estimates are for the analysis year (2020) and are rounded to two significant figures. These benefits estimates do not include several important benefits categories, including NO<sub>2</sub>-related premature mortality, ecosystem effects from nitrogen deposition, ozone-related health effects, or improvements in visibility.

#### 8a.4 Net Benefits

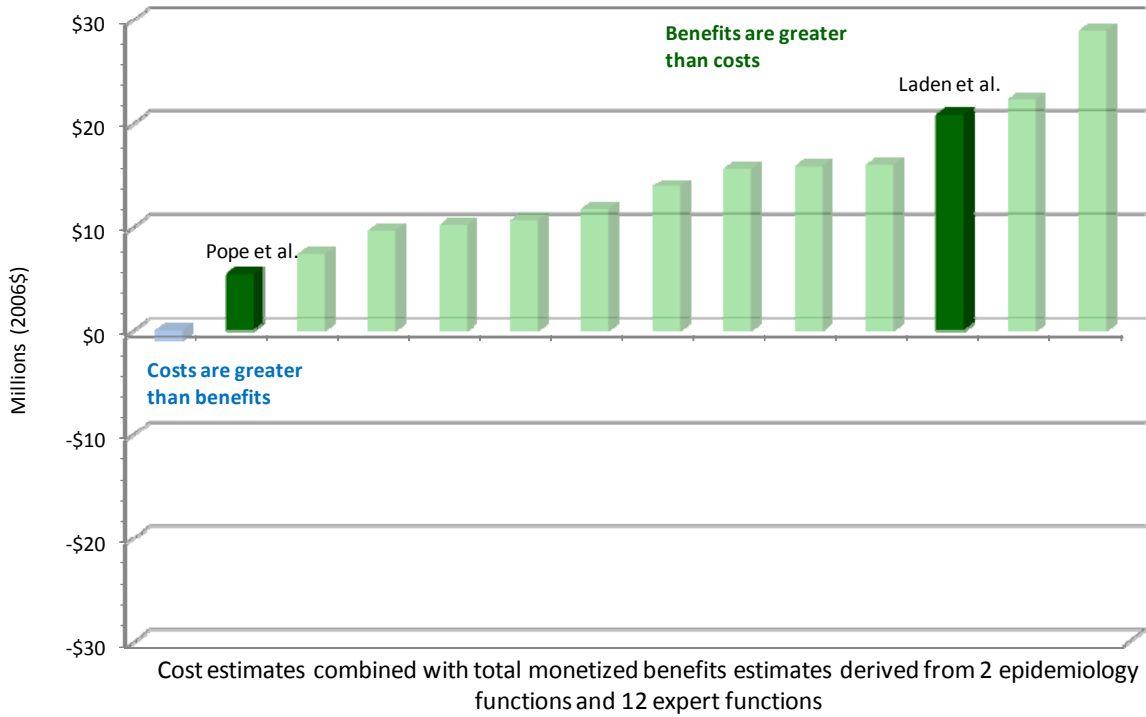
The net benefits of the alternative standard of 65 ppb are presented in Table 8a.6 and shown in graphical form in Figures 8a.1 and 8a.2. For both discount rates the benefits of attaining the alternative standard exceed the costs by an order of magnitude.

**Table 8a.6: Summary of Net Benefits for Alternative Standard 65 ppb (Millions of 2006\$)\***

	3% Discount Rate	7% Discount Rate
Total Costs + Monitoring	\$2.3 + 3.6	\$3.0 + 3.6
Total Benefits	\$11 to \$27	\$10 to \$24
<b>Total</b>	<b>\$5.1 to \$21</b>	<b>\$3.4 to \$17</b>

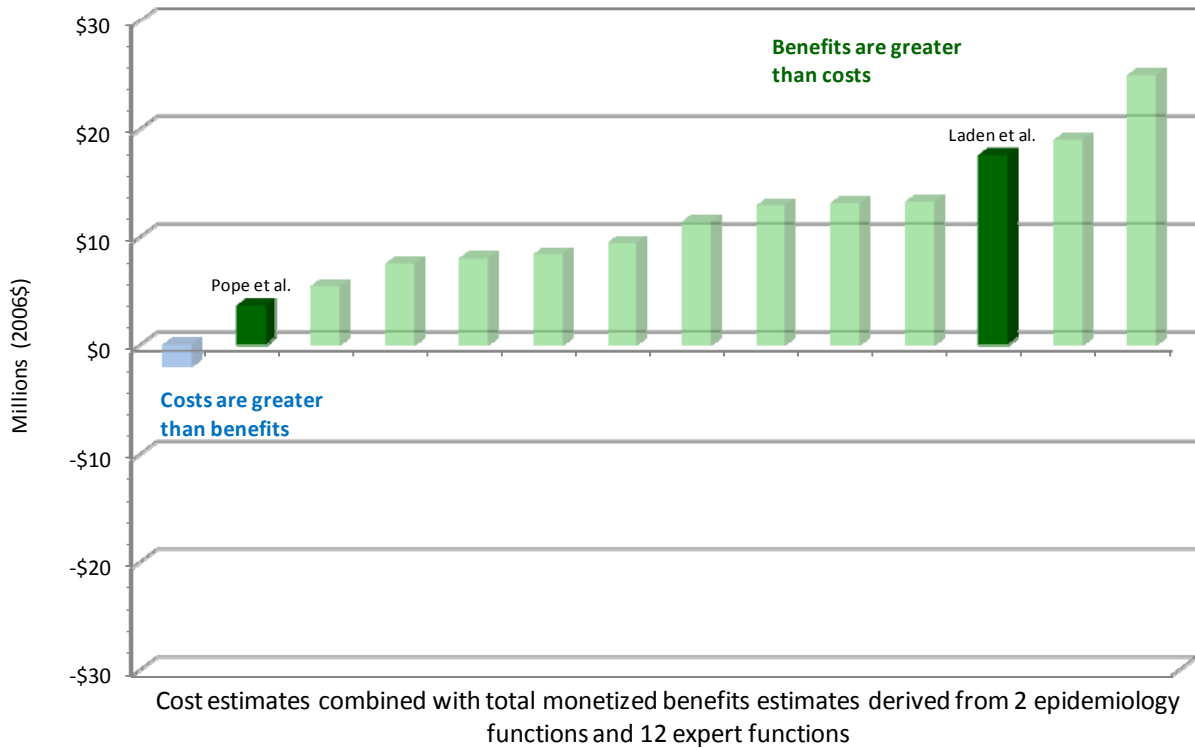
\*Numbers have been rounded to two significant figures and therefore summation may not match table estimates. These benefits estimates do not include several important benefits categories, including NO<sub>2</sub>-related premature mortality, ecosystem effects from nitrogen deposition, ozone-related health effects, or improvements in visibility.

**Figure 8a.1: Net Benefits of Fully Attaining an Alternative Standard of 65 ppb in 2020 (3% Discount Rate)**



\*This graph shows the estimated net benefits in 2020 using the no-threshold model at a discount rates of 3% using effect coefficients derived from the Pope et al. study and the Laden et al study, as well as 12 effect coefficients derived from EPA’s expert elicitation on PM mortality. The results shown are not the direct results from the studies or expert elicitation; rather, the estimates are based in part on the concentration-response function provided in those studies.

**Figure 8a.1: Net Benefits of Fully Attaining an Alternative Standard of 65 ppb in 2020 (7% Discount Rate)**



\*This graph shows the estimated net benefits in 2020 using the no-threshold model at a discount rate of 7% using effect coefficients derived from the Pope et al. study and the Laden et al study, as well as 12 effect coefficients derived from EPA’s expert elicitation on PM mortality. The results shown are not the direct results from the studies or expert elicitation; rather, the estimates are based in part on the concentration-response function provided in those studies.